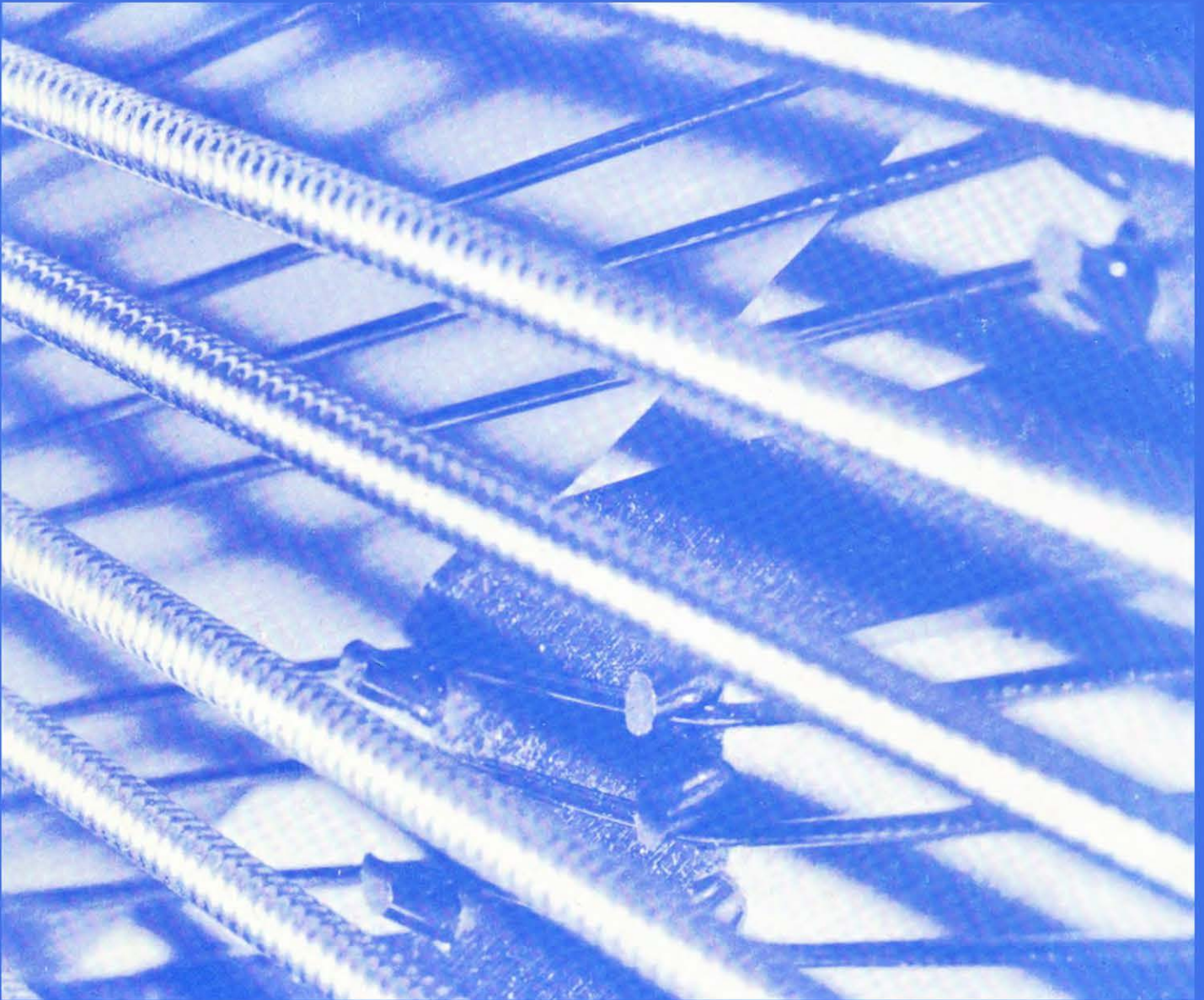


Piano Parts and Their Functions

ILLUSTRATED BY JAMES E. CAMPBELL

COMPILED BY MERLE H. MASON

EBOOK - PIANO NOMENCLATURE DIAGRAMS



A complete guide to the names and purposes
of structural and moving parts found
in contemporary pianos

How would you set about describing a pair of scissors, or wood screw, or a door key over the telephone? Aren't you glad you don't have to go into a wordy description whenever you want to mention one of these commonplace things? It saves so much time and confusion just to use the name that people have agreed upon for the article.

Now in *Piano Parts and Their Functions*, a giant step has been taken toward clarifying the language that is applied to the piano and its physical parts. As the instrument has evolved, many variations in the usage of terms have evolved with it. The compiler of this book, Mr. Merle H. Mason, has done an incredibly detailed job of ferreting out these variations.

Recognizing that standardization of piano terms is far from being complete, he states in the preface:

"The present task was undertaken, therefore, as a bringing together into one book of as many as possible of these terms in common usage. To this end, manufacturers and widely scattered piano technicians were asked to submit their lists. Other sources . . . were carefully studied . . .

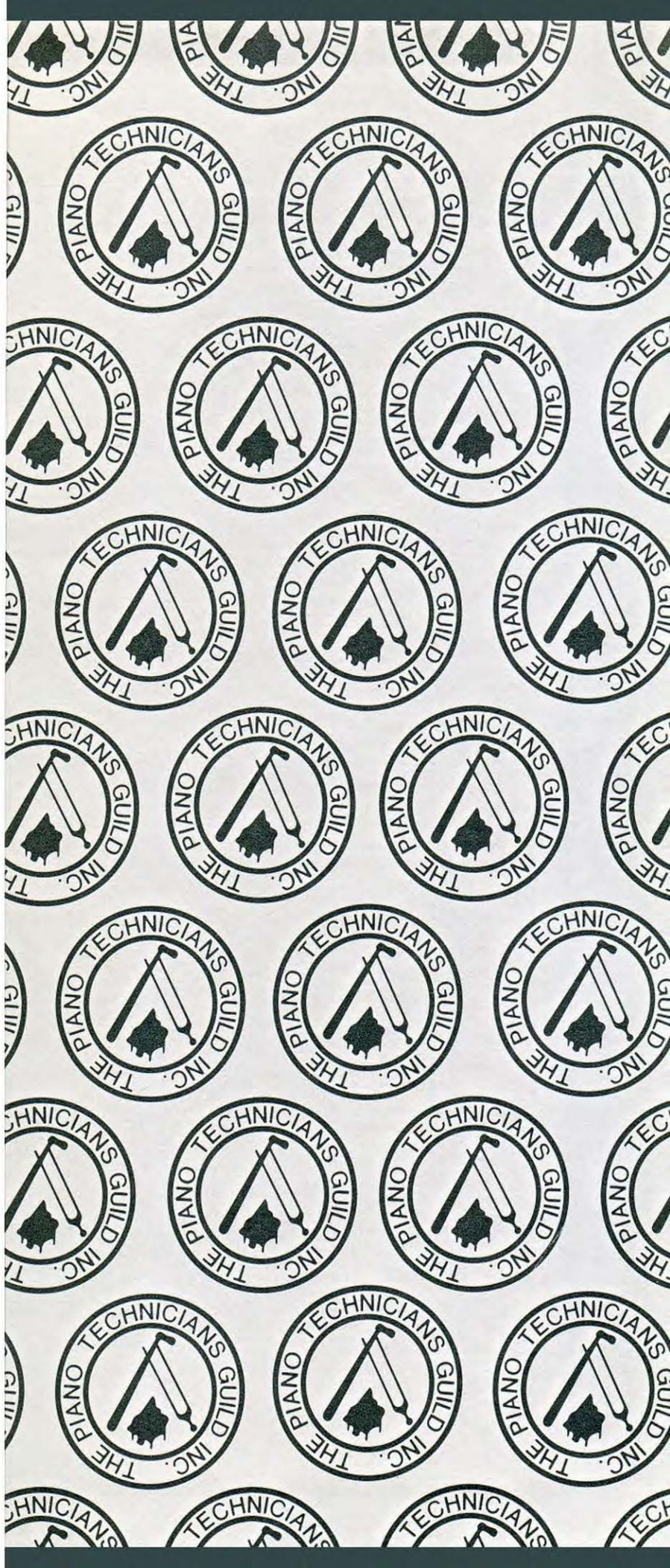
"It was decided to encourage standardization in the use of terms by giving first place in listings to names preferred by Guild technicians wherever a strong measure of agreement in preference could be identified."

The book is generously illustrated with line drawings which are thoroughly keyed to part names. Except for a few features which may be unique to one or two makes of piano, the drawings are meant to be very general and sometimes composite. Hence the emphasis has been on making them diagrammatically clear, rather than literally descriptive.

The enormous amount of careful work which Mr. Mason has put into the preparation of this book can scarcely be imagined. His hope, expressed in the preface, is "that this book may serve the interests of piano technicians in particular and of musically minded persons at large. We also hope that this work will contribute to a later more solid approach to the standardization of piano nomenclature."

Piano Parts and Their Functions (Illustrated) deserves the widest circulation among those whose interest lies in this remarkable instrument.

Don S. Galt RTT



Piano Parts and Their Functions
(ILLUSTRATED)

THE PIANO ACTION HANDBOOK (2nd Edition, 1972)

*... A Compilation of Manufacturer's Specifications
for All Pianos Made or Marketed in America*

THE PIANO TECHNICIAN'S JOURNAL

*... A Monthly Magazine Dealing with the Technical
and Professional Aspects of Piano Service*

*Piano Parts
and
Their Functions*
(ILLUSTRATED)

COMPILED BY MERLE H. MASON

THE PIANO TECHNICIANS GUILD
SEATTLE

1981

A preliminary edition of this title was printed by the Piano Technicians Guild in 1977.

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Piano Parts and Their Functions (Illustrated)

Presenting

Diagrams of the many separate parts of different types of pianos, accompanied by the names in the English language commonly used to designate these units.

An alphabetical list of these names together with the assigned numbers by which the corresponding parts in the drawings may be located.

A glossary consisting of:

1. Names of various parts of a piano not readily open to visual representation;
2. Names and descriptions of various mechanical functions of concern to both piano technicians and performers; and,
3. A list and definitions of many musical terms that are found in vocabularies of piano technicians and/or musicians-at-large, and which often need clarification.

Compiler

Merle H. Mason

Registered Craftsman Member

The Piano Technicians Guild, Inc.

With cooperation of

The Executive Director, Staff, and Members of the Guild

The Guild's Committee on Nomenclature and Service Manuals

The Manufacturers of Pianos and Suppliers of Piano Parts

Published by

The Piano Technicians Guild, Inc.

P.O. Box 1813, Seattle, Washington, 98111

U.S.A.

Foreword

One of the most valuable services an organization such as The Piano Technicians Guild can perform when a need is identified is to fill it. Through a happy set of circumstances, this book represents an excellent example of such a need fulfilled by the cooperation of many people.

As long as there have been pianos it has been difficult for those who build, sell, and service pianos to convey ideas about the qualities and capabilities of a particular instrument with the user, and vice versa. The language of each group involved differs, often because of training or regional background, but even more because of poor understanding of the purposes and effects of different methods or styles of construction.

To the piano player musical potential and the musician's control over the instrument are of prime importance; the language used to describe performance, or lack of it, is essentially subjective.

To the maker and the service person piano language tends to be objective, relating to design, materials, placement, and maintenance. The need has been to bridge the subjective-objective communications gap so that those who use pianos and those who make and service them can understand each other better.

A lesser but very real problem has been the lack of uniformity among manufacturers in names for the same parts of pianos. Because the art of piano making borrowed from several widely differing crafts, and because it developed at about the same time in different countries, names of nearly identical parts differ curiously, adding to the confusion.

Fortunately, a scholarly gentleman, Merle Mason, whose energy belied his officially retired status, agreed to assemble the data necessary to catalogue these differences in language and present them in a manner that could be understood by all. Over several years of dedicated work, with the cooperation of piano manufacturers, parts suppliers, and other PTG members, Mr. Mason has produced an invaluable contribution to all persons who have anything to do with pianos.

This book may be enlarged and improved in the future if a greater or more extensive need becomes evident. In the meantime, PTG's **Piano Parts and Their Functions (Illustrated)**, compiled by Merle Mason, will deserve an honored place in the reference library of everyone who uses, builds, services, or just admires - this magnificent musical instrument.

James H. Burton
Executive Director (1965-1977)
The Piano Technicians Guild

Preface

This book grew out of a conversation which took place in the summer of 1967. The compiler asked Mr. James Burton, then Executive Director of the Piano Technicians Guild, Inc., how he might serve the Guild in the field of writing during leisure hours of retirement. Three projects were suggested: 1) a Piano Action Handbook (revision and expansion of a limited and outdated booklet); 2) an index to technical matter that has appeared in *The Piano Technician's Journal* and its periodical forebears; 3) a book on Piano Nomenclature. The first of these has been published, and compilation work on the second has been completed. The third task (this book) was begun in 1971.

The potential value of a book on piano nomenclature has long been apparent. Such a reference book would simplify and clarify communication about pianos among builders, technicians, students, teachers and performing musicians. Existing lists of this type are limited in extent and availability. **Piano Nomenclature**, by Klaus Schimmel (Verlag das Musikinstrument, Frankfurt am Main, West Germany, 1966) gives the names of piano parts in five languages, with some diagrams, keyed to the Schimmel pianos. Some other piano makers in this country and abroad have published booklets, sheets, charts or service manuals giving their name preferences for their own products. Parts names also appear in the catalogs of piano supply houses, in piano-related journals, and in dictionaries and encyclopedias.

A survey of such sources as these revealed wide variations in the usage of the names of piano parts and functions. The present task was undertaken, therefore, as a bringing together into one book of as many as possible of these terms in common use. To this end, manufacturers and widely scattered piano technicians were asked to submit their nomenclature lists. Other sources such as those listed above were carefully studied.

To begin with, the scope of this book had to be defined. It was decided to cover only the two general types of pianos: grands and verticals. The latter include all modern pianos which have their soundboards and strings running vertically, i.e., spinets, consoles and uprights. Antique pianos, player pianos and electrical pianos are excluded as too specialized for the purposes of this book. So-called square pianos are omitted since terminology in use for grand pianos generally can be adapted to the squares.

The size and number of diagrams called for much thought, with maximum clarity in minimum space dictating the final policy. To avoid duplication some drawings are composites which, while borrowing some recognizable brand details, do not represent any particular piano.

Names used for parts not easily diagrammed, for piano-related functions, and for pertinent musical terms have been assembled in a glossary at the back of the book. As a basis we have used material set up in print at one time but apparently never reaching the stage of publication. It was entitled **Glossary** and carried the name of F.E. Morton, Moderator, Conference of Piano Technicians, Feb. 26, 1919. At the top of the pages appear the words: "Alpha-numeric, Inc. Textran. Job: Simrall Piano Book. Batch 70." We hereby acknowledge considerable use of those pages but with many deletions, alterations and additions.

Most of the decisions relating to the form and substance of this work have been made by the compiler, with the counsel of the Executive Director of the Guild. The compiler therefore must assume major responsibility for errors, omissions, or other shortcomings.

In the latter stages of the work, a Committee on Nomenclature and Service Manuals of the Guild gave a great deal of help, reviewing the first draft, examining the text and diagrams, and

recommending appropriate revisions. Immeasurable help in this connection was given by Mr. Don S. Galt. It was decided to encourage standardization in the use of terms by giving first place in listings to names preferred by Guild technicians, wherever a strong measure of agreement in preference could be identified. A sub-committee of the above named committee gave long hours to this complex task.

Services rendered by this smaller committee as well as by the general committee and by Guild officers have been invaluable. Among those to be mentioned in particular are Messrs. Erroll P. Crowl, LaRoy Edwards, Lewis F. Herwig, Newton J. Hunt, Stephen S. Jellen, John L. Scheer, Carl Warmington, and Roger H. Weisensteiner. Messrs. Francis Mehaffey and W. Dean Howell gave valuable counsel. Mr. James Burton, as already indicated, gave continual guidance, besides carrying out the plans for publication. The names of manufacturers and others who have cooperated most generously and willingly are too numerous to mention in this place. We can only express gratitude to them in general.

Special thanks are appropriately extended to Mr. James E. Campbell for redrafting and improving all of the original illustrations.

We hope that this book may serve the interests of piano technicians in particular, and of musically minded persons at large. We also hope that this work will contribute to a later more solid approach to the standardization of piano nomenclature.

Merle H. Mason, compiler,
Chairman of The Committee on
Piano Nomenclature and Service Manuals,
The Piano Technicians Guild, Inc.

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Introduction to Diagrams

The diagrams in the following pages correspond fairly closely to actual piano parts. A few of them, however, represent no particular type of piano but are a space-saving composite with a combination of parts that could not occur in any one piano.

The names of manufacturers frequently accompany the names of parts. This arrangement is not meant to imply that only those particular makes of pianos use those terms. It is meant to indicate that substantial backing for the use of those words is to be found in this or that manufacturing plant. It may also assist in communications with these plants and in the understanding of literature produced by them. The mention of but one manufacturer's name (or a decidedly limited number of such names) often means that detailed descriptions at these points appeared in only that number of our resource materials.

Where multiple terms appear, the first two are considered to be the more widely used and more generally acceptable. The preference of members of The Piano Technicians Guild inclines toward the foremost of the two. The remaining terms follow in what is felt to be the narrowing order of their usage. The order of preference has come about only after a deliberate committee- review of the compiler's manuscript. (See pertinent paragraphs in the Preface.)

The word *after*, attached to the name of a manufacturer or other individual mentioned in connection with the diagrams, is meant to indicate that modifications of originals have occurred which are not to be attributed to the companies or persons mentioned. It is to be hoped that no such alteration will prove objectionable to those who have provided the basic drawing.

It is regrettable that more of the items in the later miscellaneous pages could not have appeared nearer to the diagrams with which they are naturally associated. Many of them came in- to being only after suggestions of readers or second thoughts of the compiler called for greater detail at a number of points. This process, obviously, could have gone on indefinitely; but space requirements and other considerations finally brought the extension program to a close.

A few of the pages giving parts-names are somewhat crowded; but it was deemed wise to confine to the one page opposite any one set of drawings all the names associated with the numbers appearing with those illustrations.

For the reader's convenience in locating diagrams of particular parts of the piano, headings for the different pages of drawings together with the appropriate roman numeral attached thereto are listed on the separate page following this. The first paragraph on page 1 (index to the Names of Piano Parts) will give the reasons for use of roman numerals rather than page numbers on the pages of parts-names.

It is inevitable that errors and omissions of various kinds will appear in this kind of book because of the difficulty of correlating so many widespread variations in piano terminology. Different sections of the country develop distinct usages; and many different types of piano-related persons, both professionals and novices, refer to piano parts with a nomenclature all of their own. Appropriate alterations, we trust, will appear in later editions. -MHM

LIST OF
DIAGRAMS OF PIANO PARTS

Verticals

- I. External and Internal Aspects of Verticals
- II. End View of Vertical Piano
- III. Plate in Verticals
- IV. Pinblock, Strings, and Tuning Pins
- V. Action-related Parts in Vertical Pianos
- VI. Keys and Keyframes
- VII. Sticker and Connections
- VIII. Pedal Assembly with Muffler as in Yamaha Console

Grands

- IX. Cabinet View of Grand Piano; Fall Board and Key Assembly
- X. Grand Piano as Seen From Below
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- XIII. Housing for Action, in Grand Piano
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- XVIII. Duplex Scales; Plate Bottom, in Verticals; Tone Stabilator, in Grands
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- XXII. Details for Some Parts of Grand Pianos
- XXIII. Miscellaneous
- XXIV. Hammer Butt Coverings; Auxiliary Whip; Damper Wedges and Rods
- XXV. Miscellaneous Items and Details from Other Drawings

Diagrams

End View of Vertical Piano

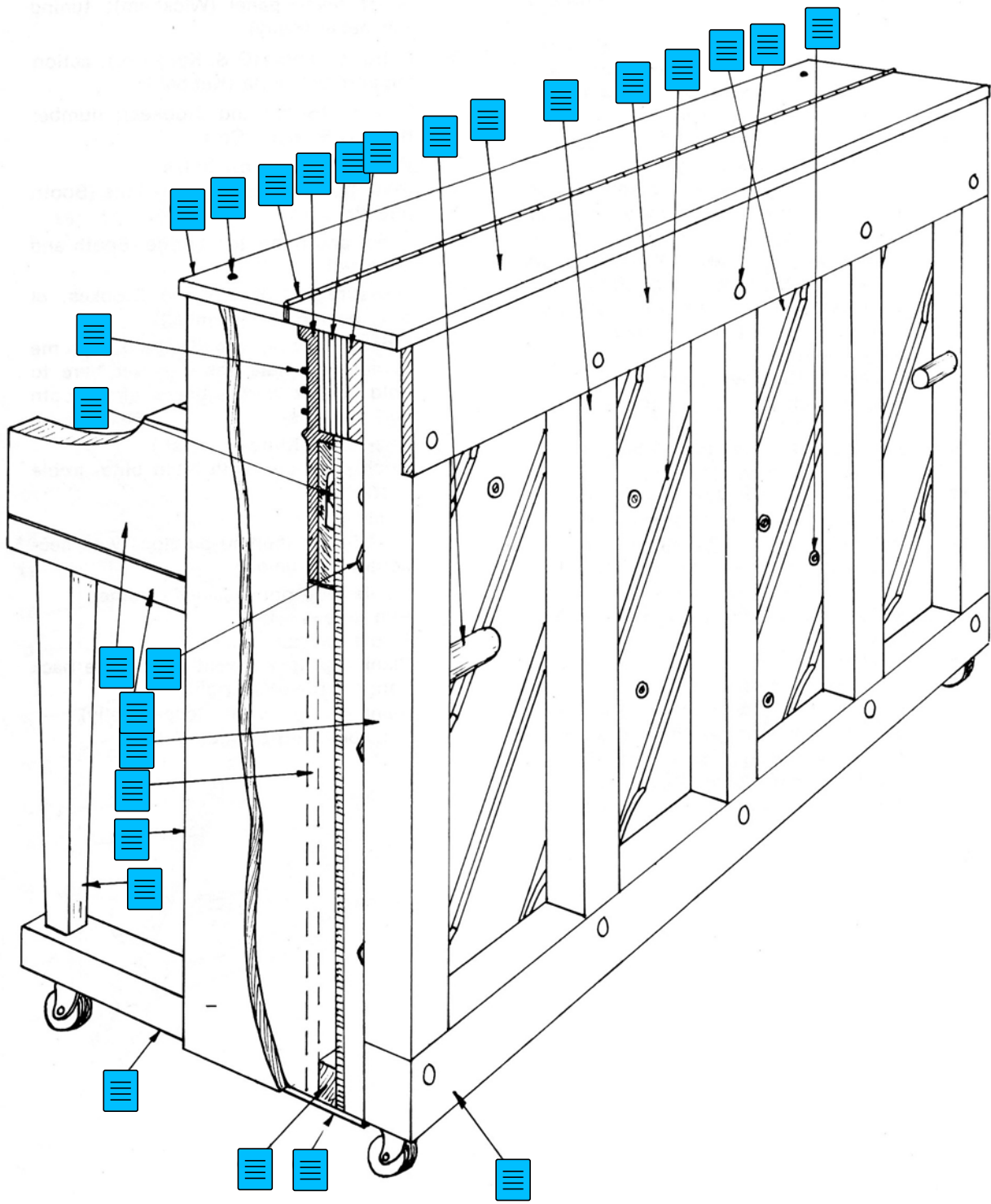
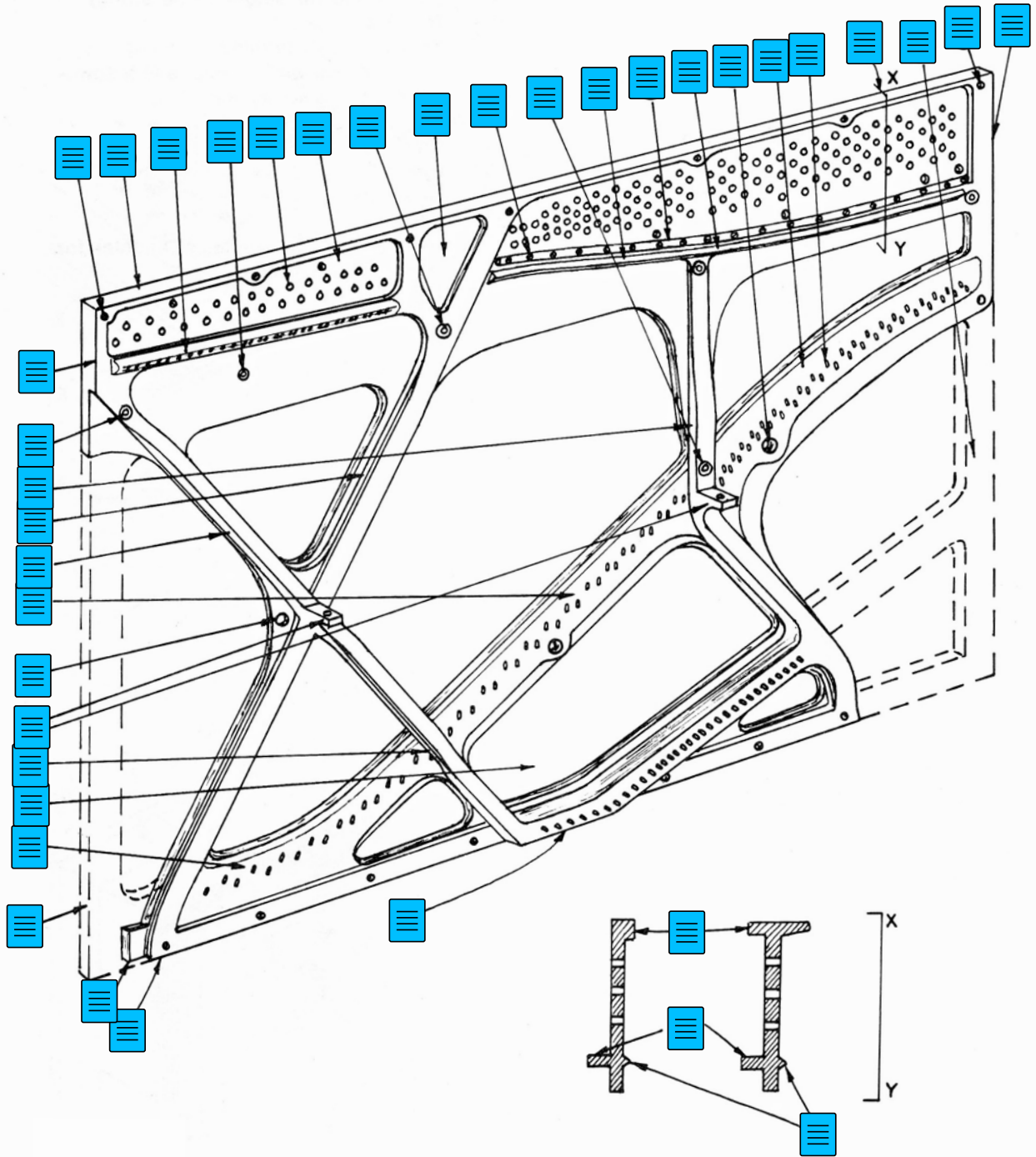
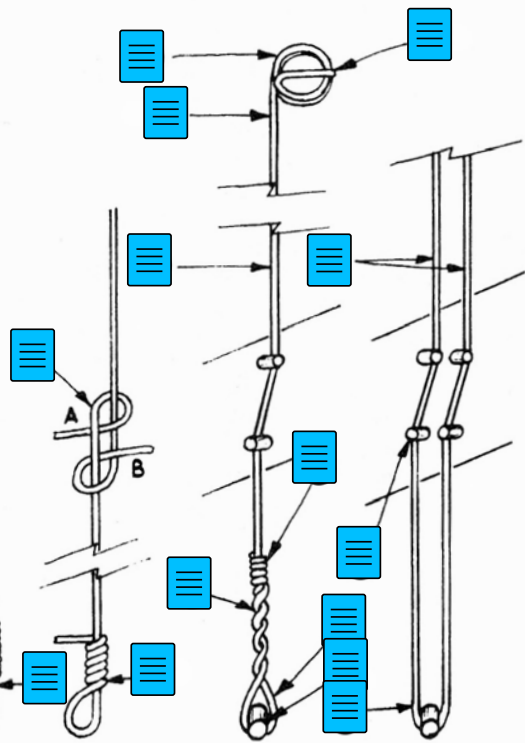
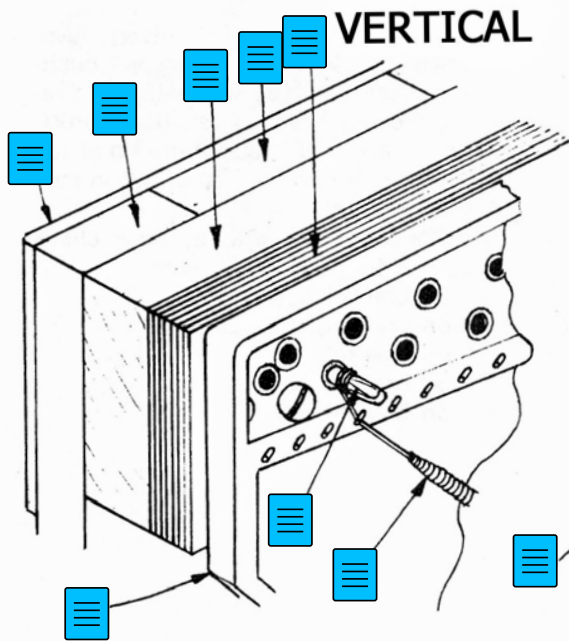
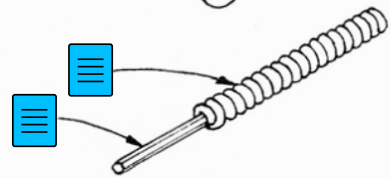
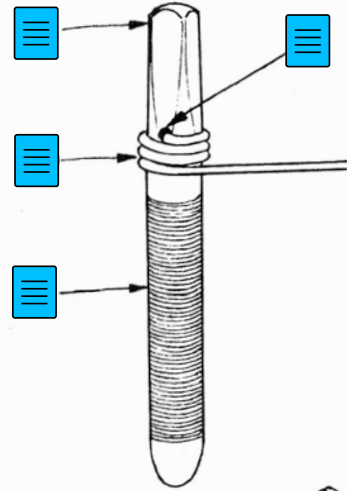
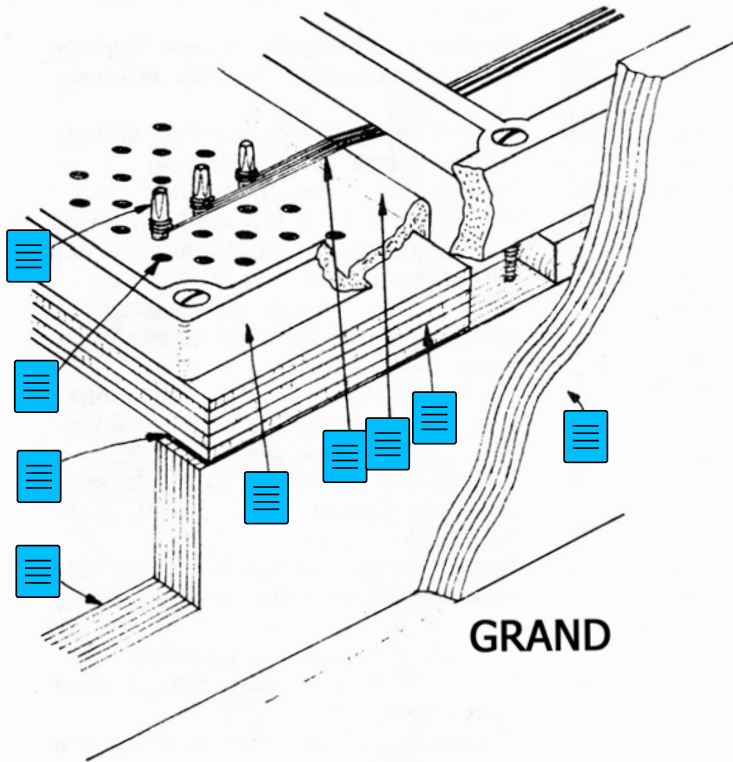


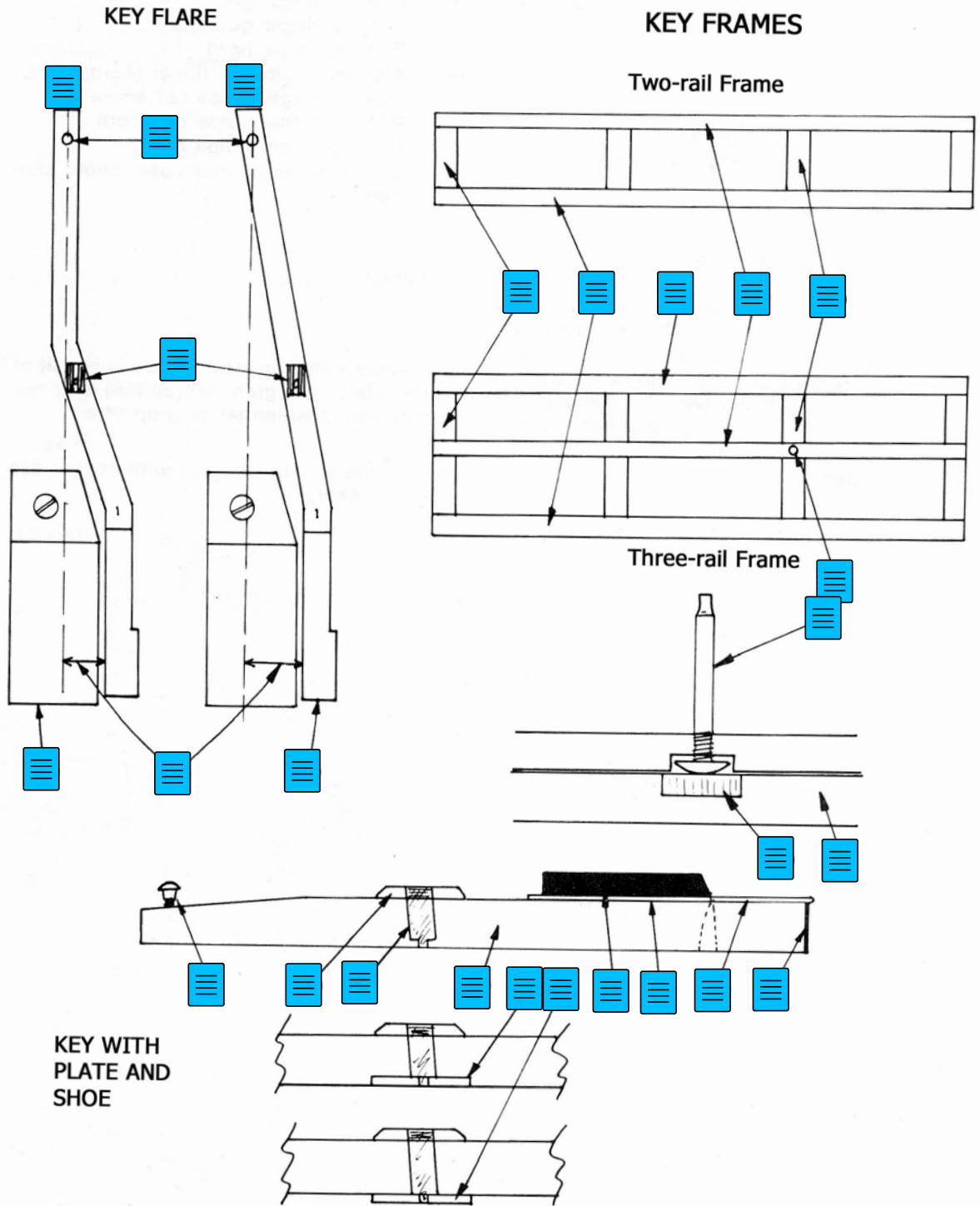
Plate in Verticals



Pinblock, Strings, and Tuning Pins

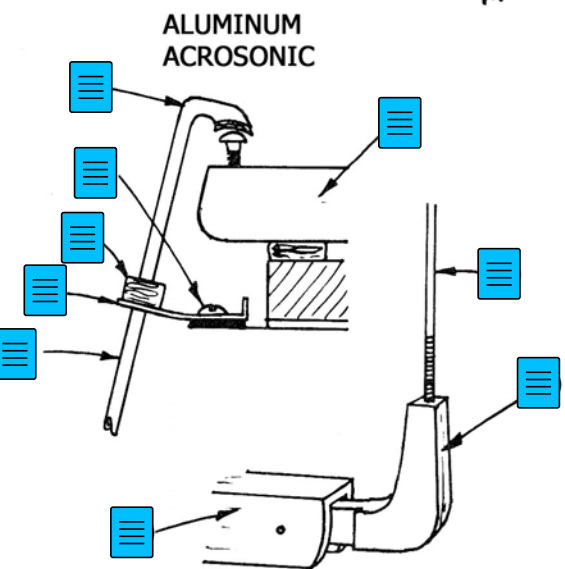
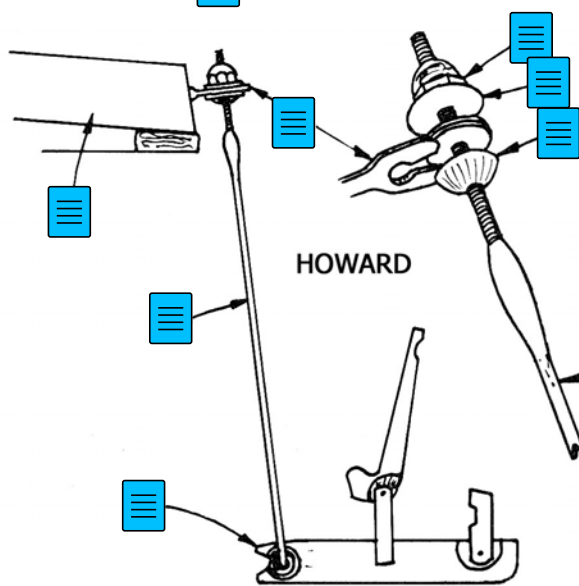
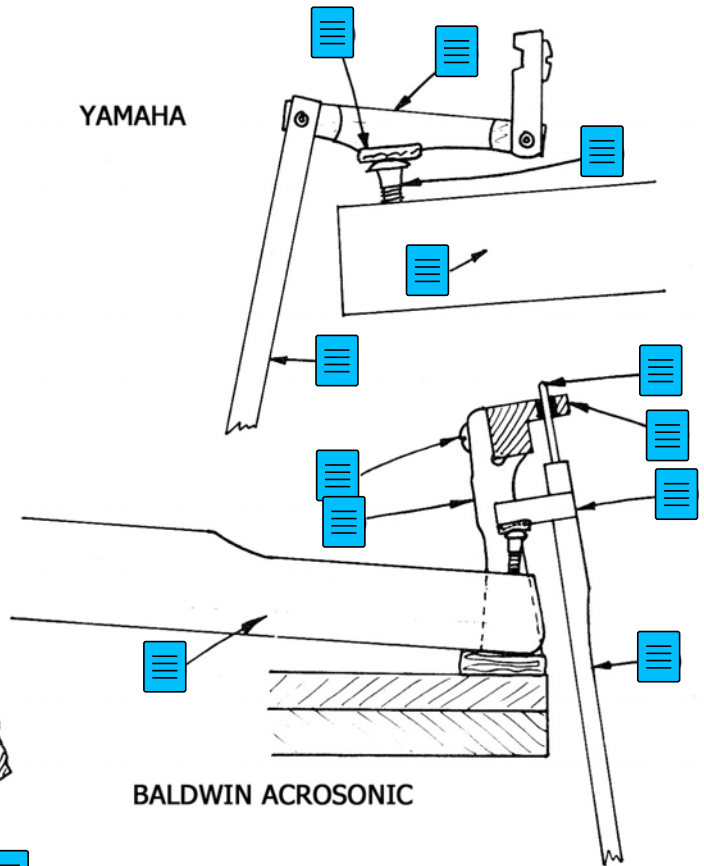
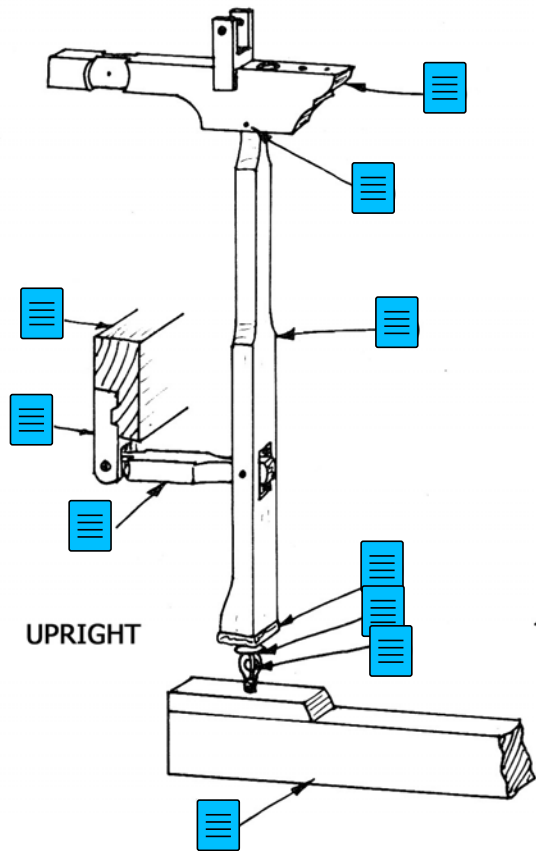


Keys and Key Frames



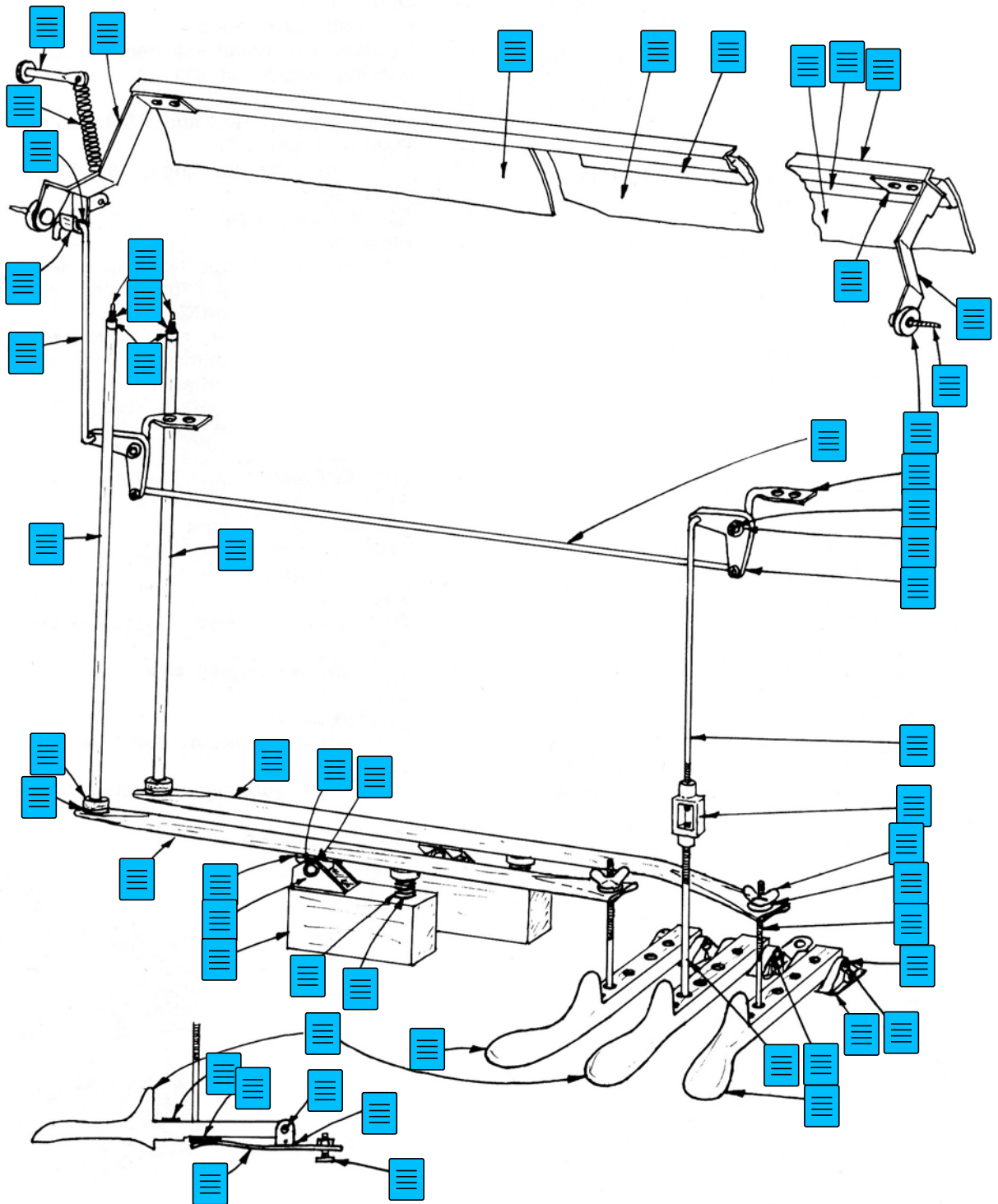
VII

Sticker and Connections



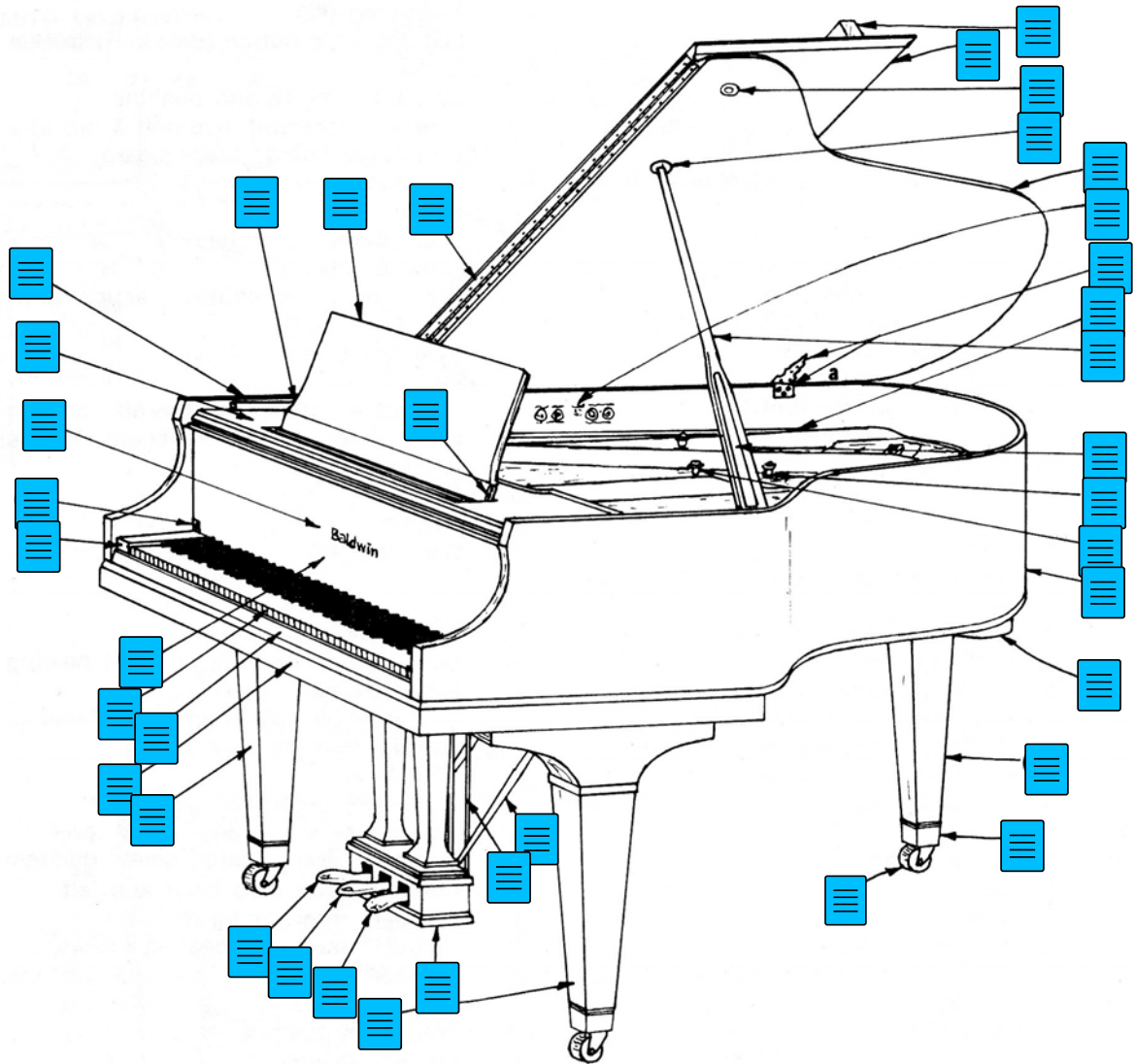
VIII

Pedal Assembly with Muffler as in Yamaha Console



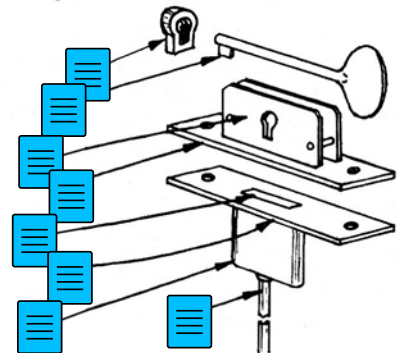
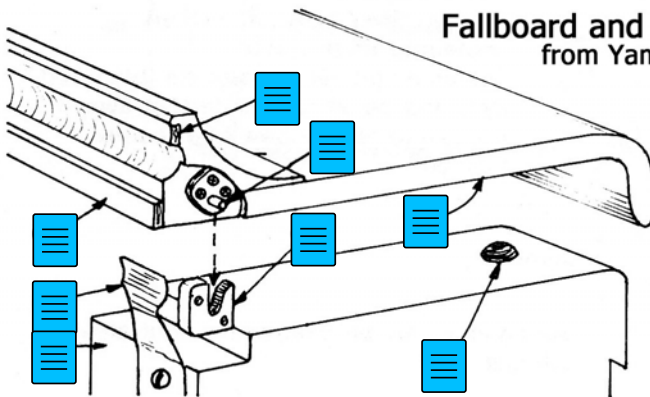
Cabinet View of Grand Piano

from Baldwin



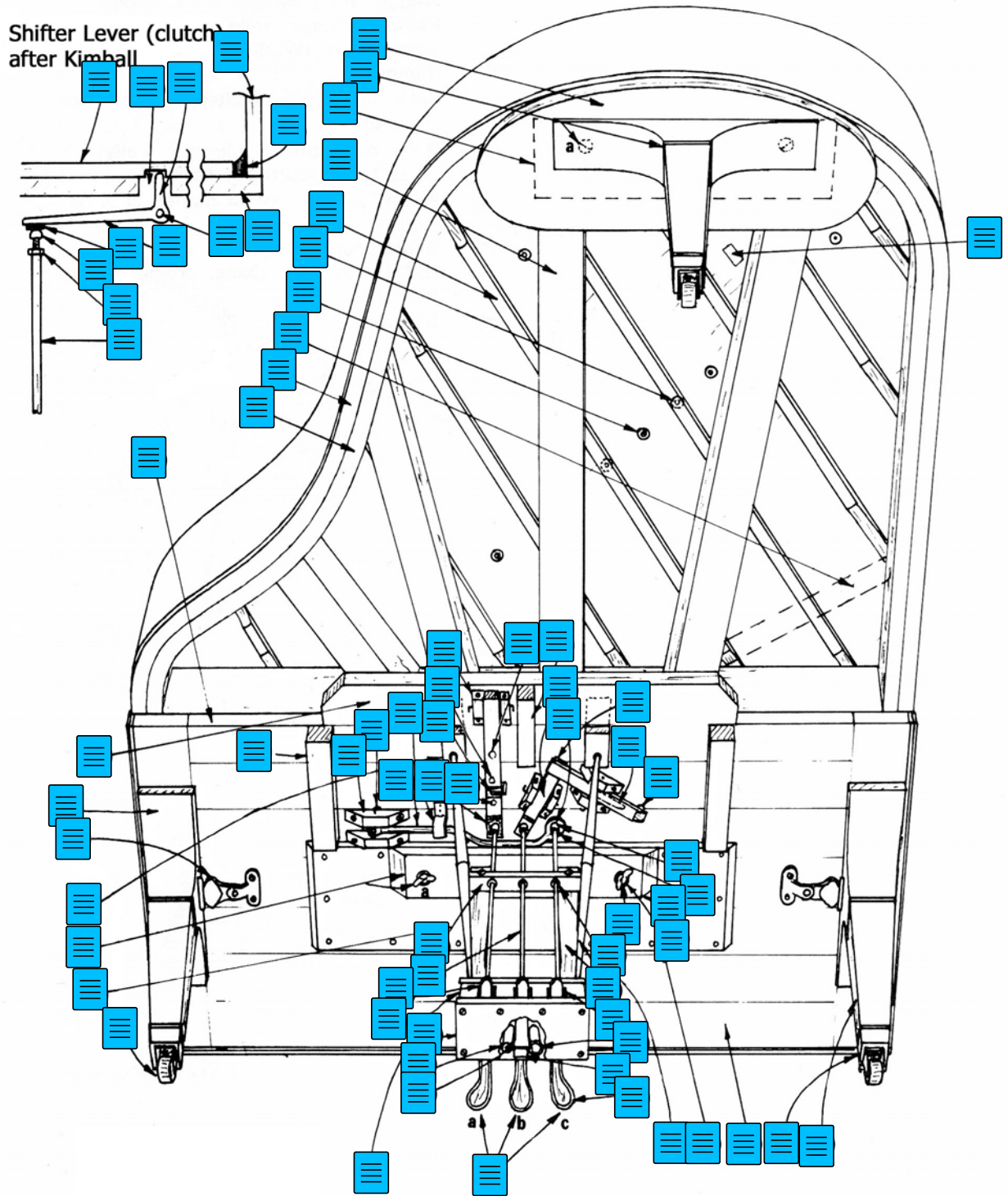
Fallboard and Key Assembly

from Yamaha

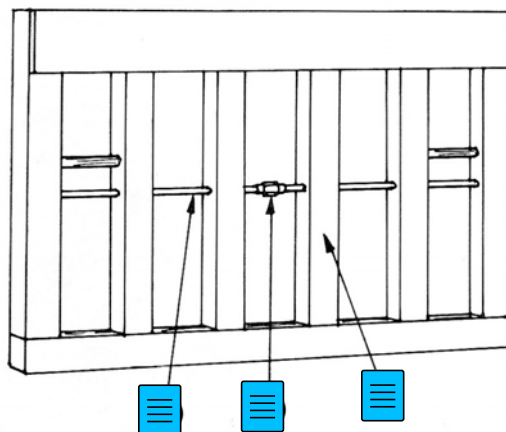
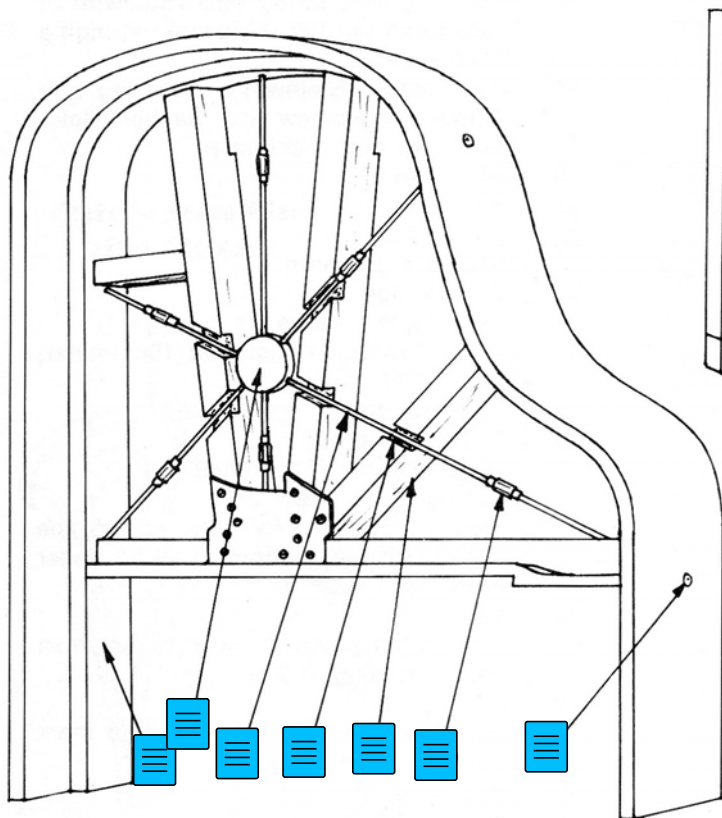


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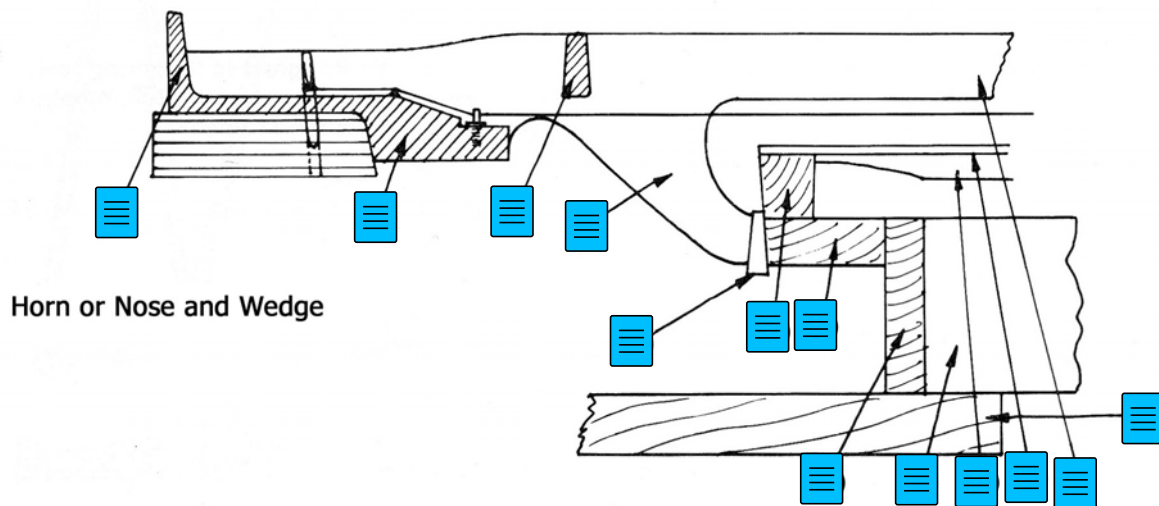
Grand Piano as Seen from Below



Tension Resonator and Horn or Nose in Grand Piano

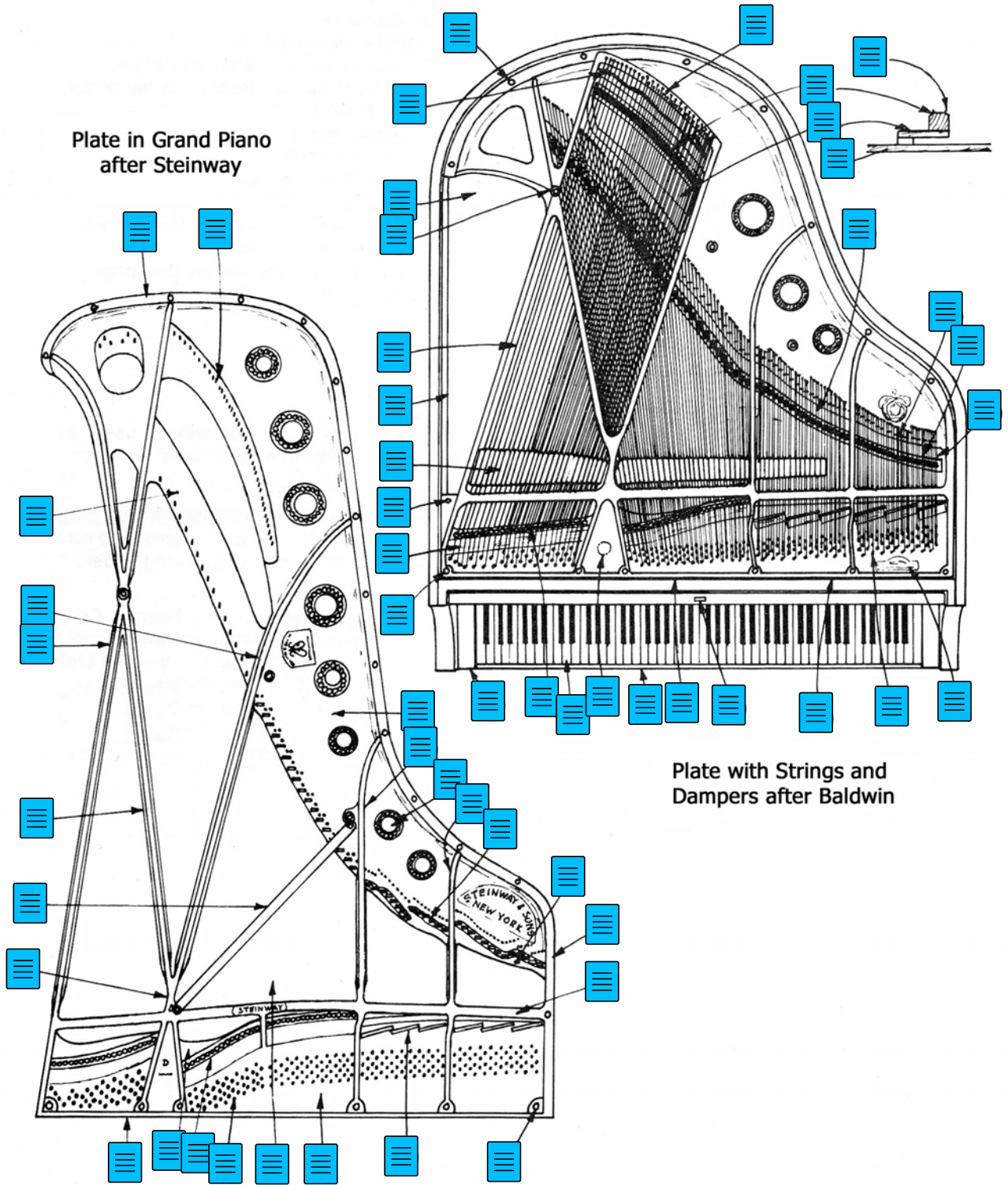


Tension Resonators
(after Mason and Hamlin)



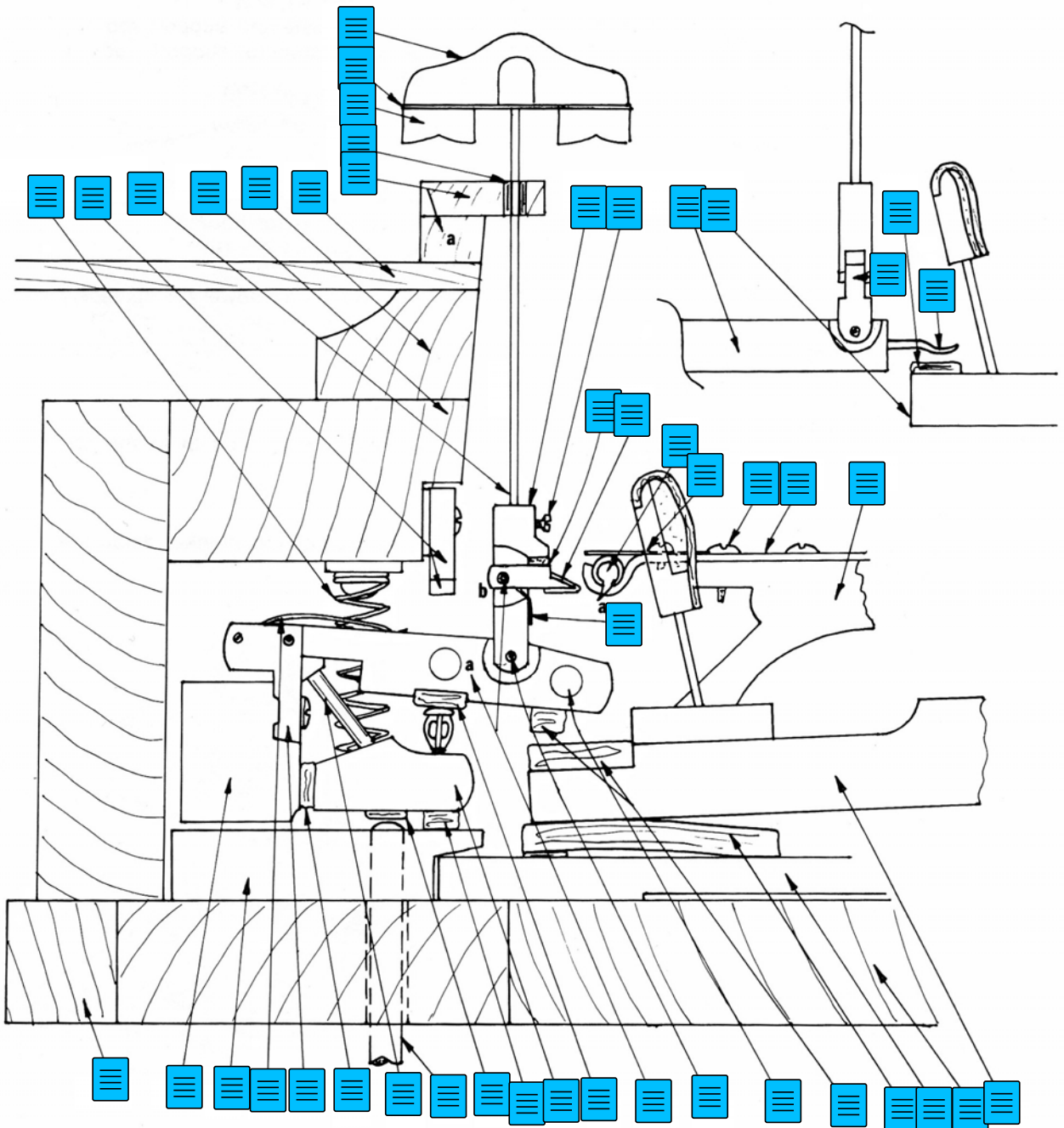
Horn or Nose and Wedge

Plate in Grand Piano



The Damper and Its Associated Parts

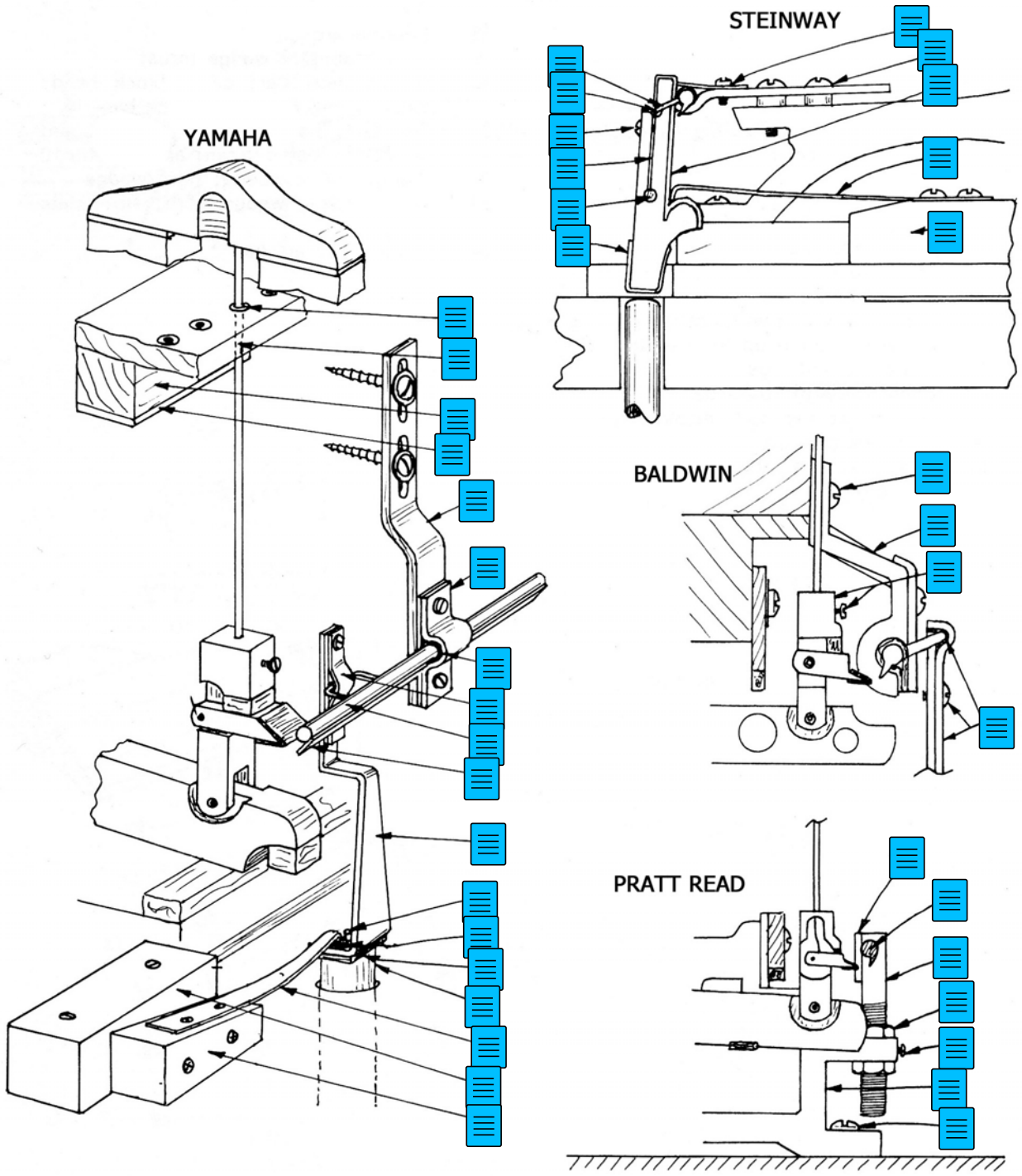
Composite



XVII

Variations on Damper Associated Parts

Sostenuto Rod Connections



Duplex Scales, Vertical Plate Bottom, Tone Stabilator

DUPLEX SCALES

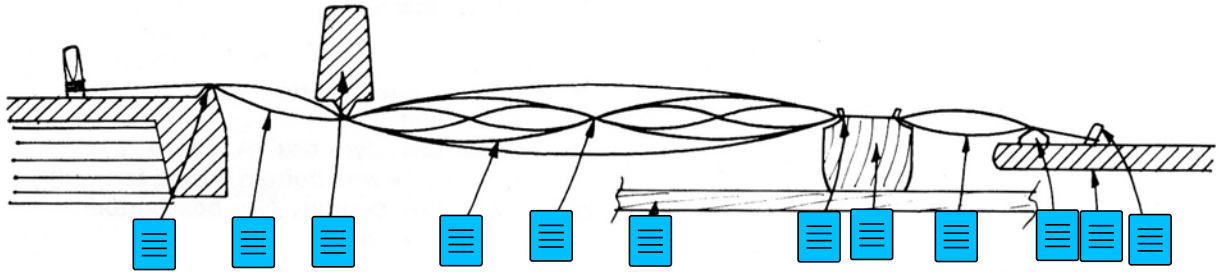
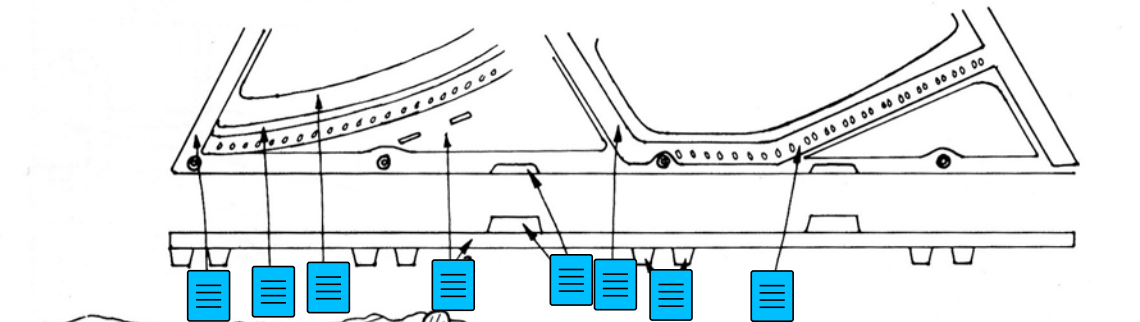
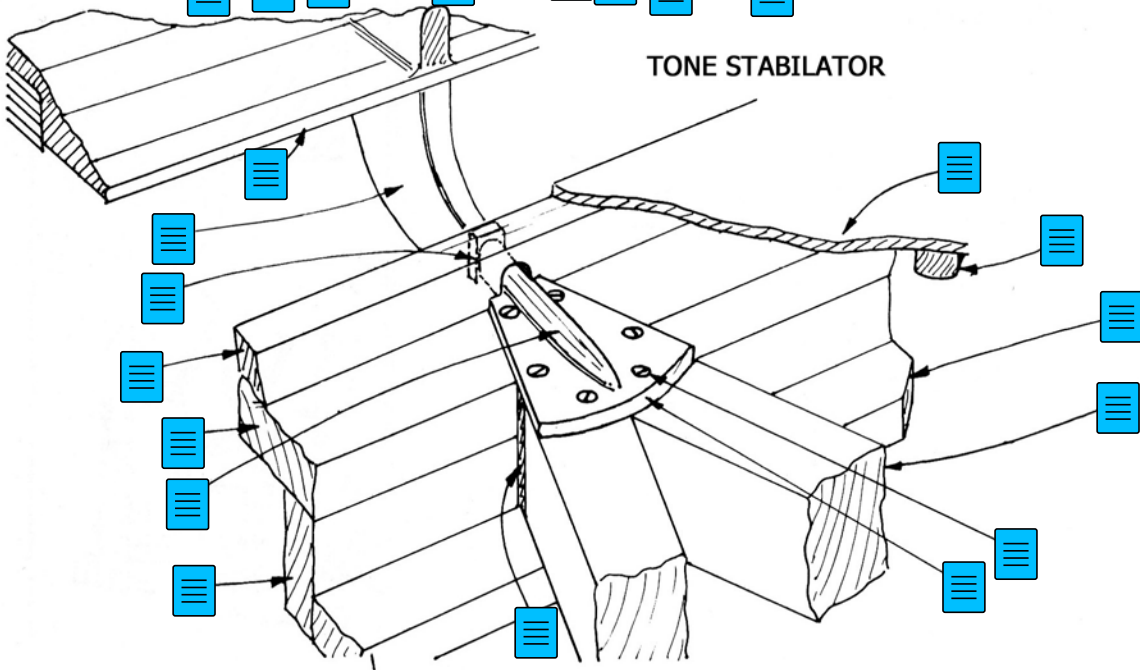


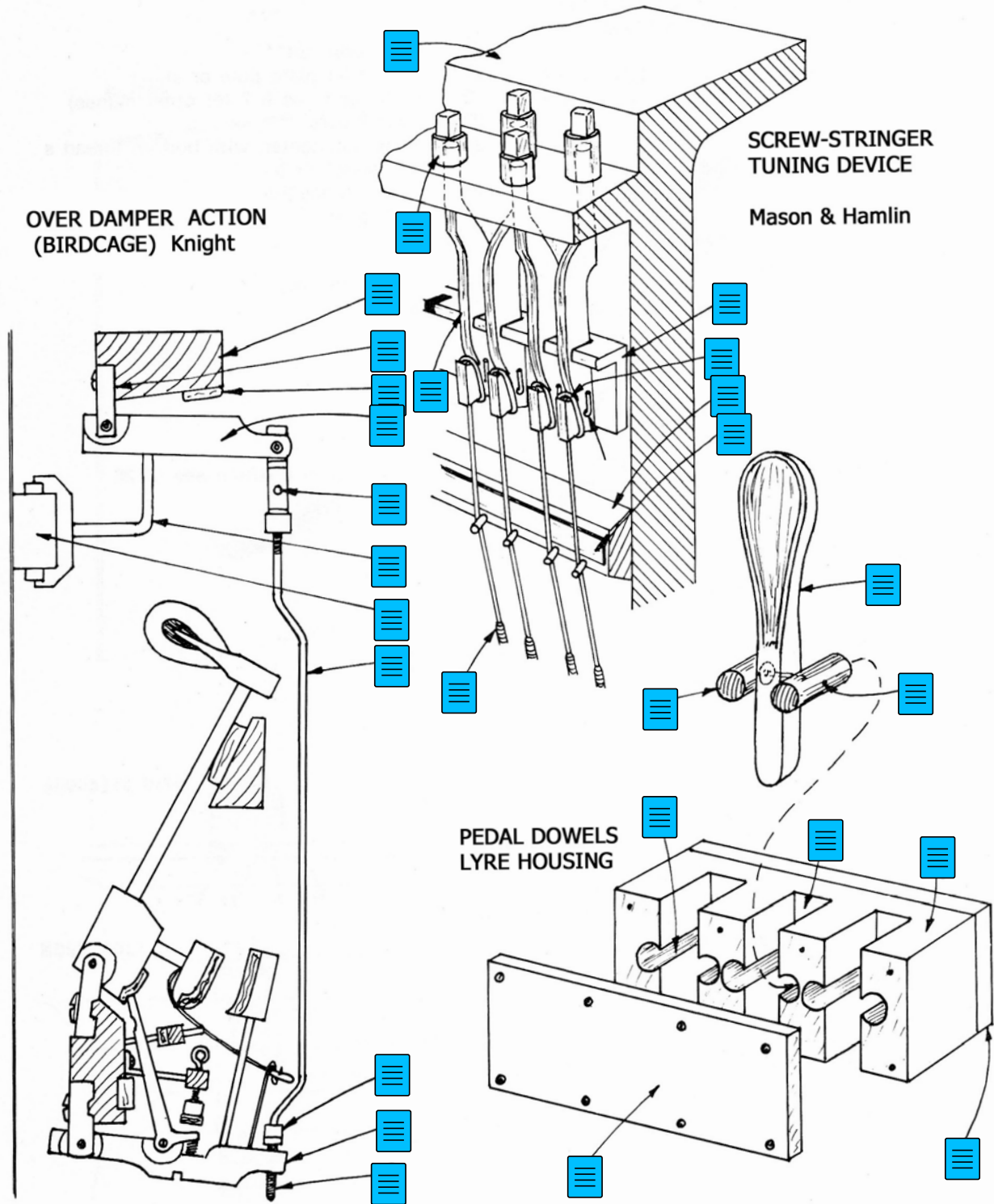
PLATE BOTTOM



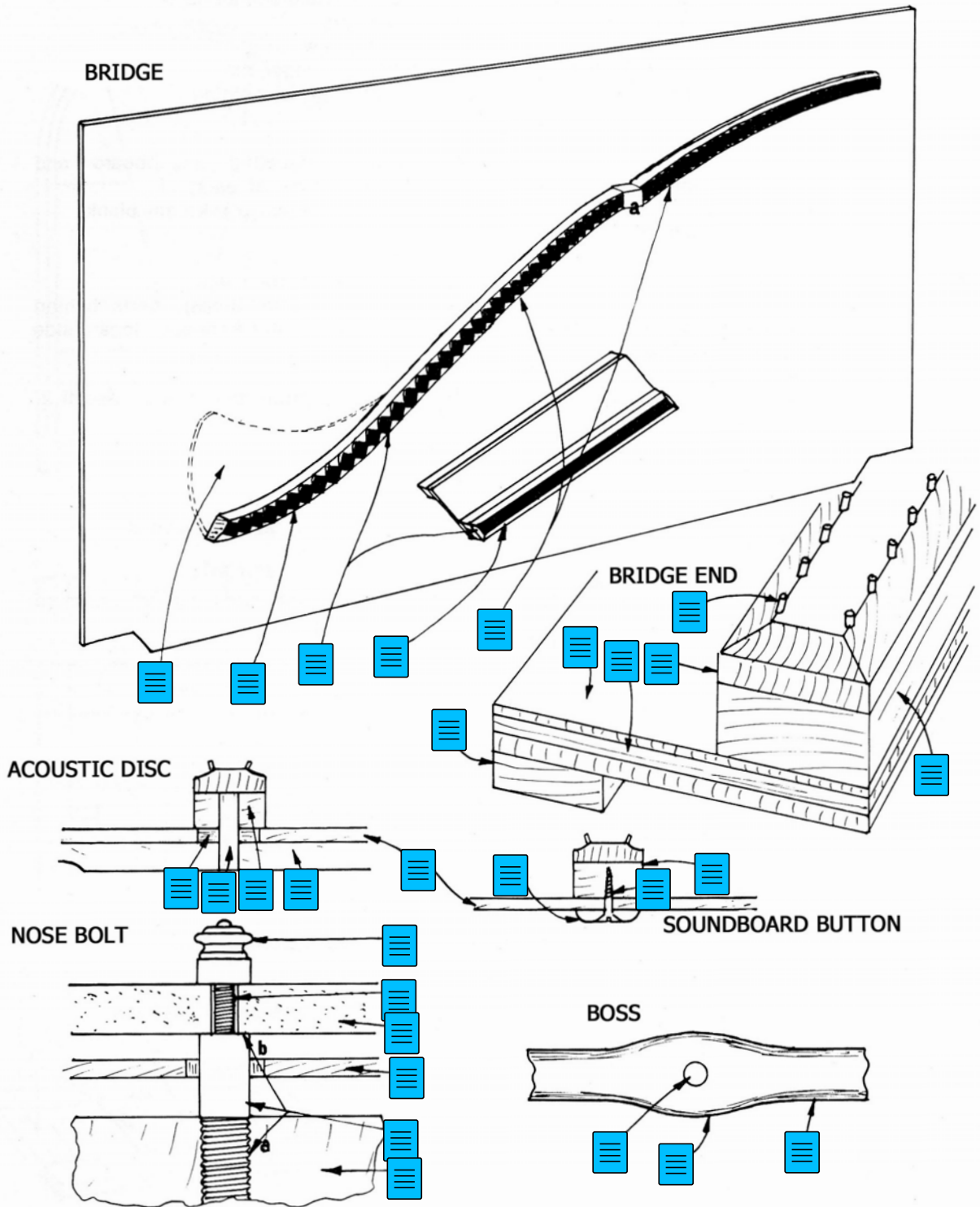
TONE STABILATOR



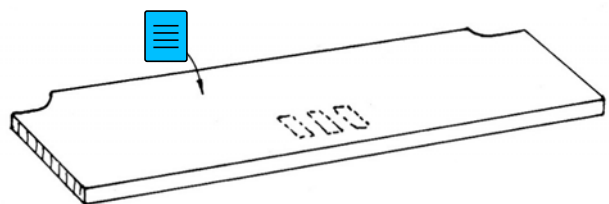
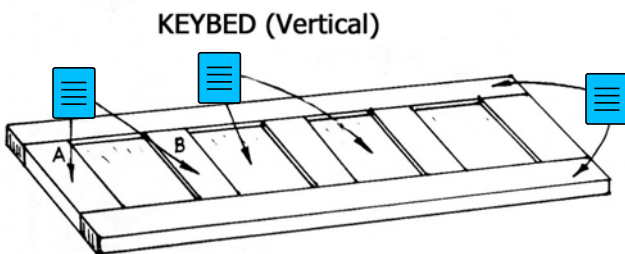
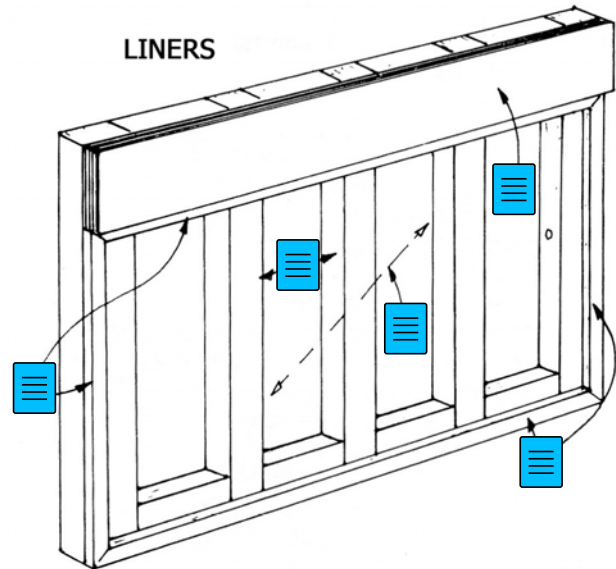
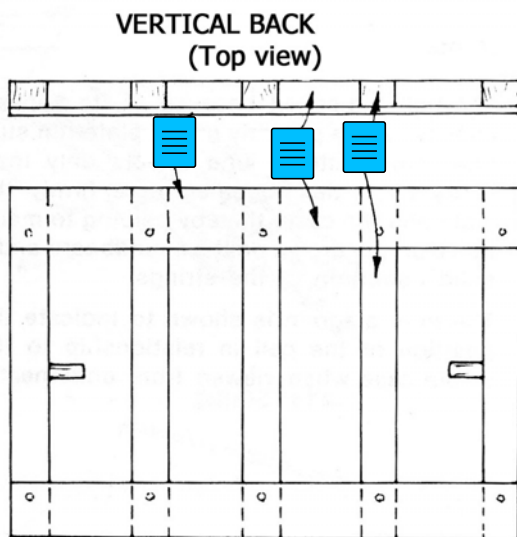
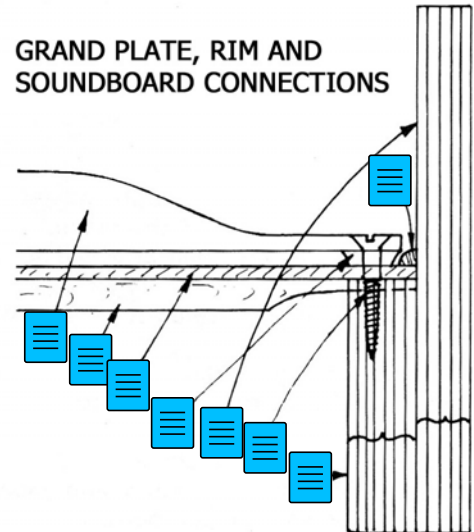
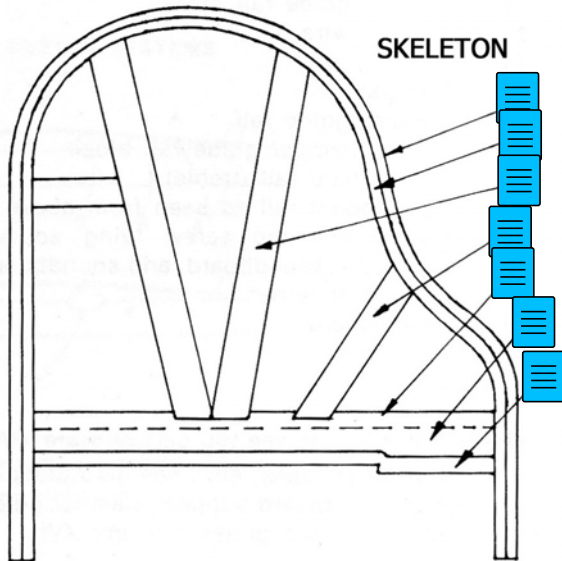
Screw-stringer, Lyre Housing, Overdamper Action



Bridge, Button, Disc, Nosebolt, Boss

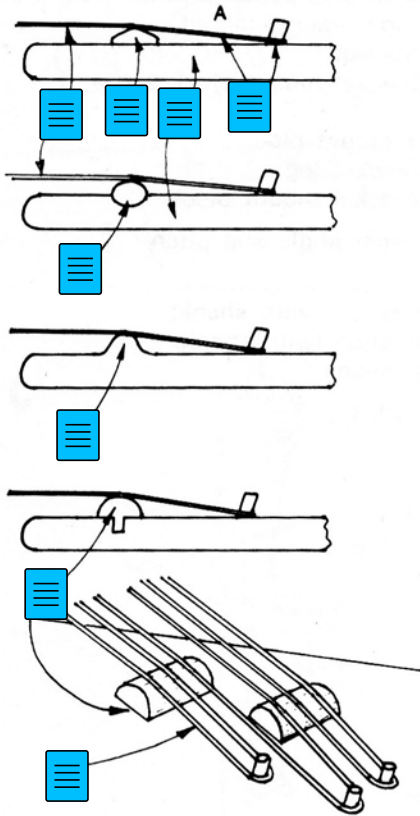


Skeleton, Back, and Keybed

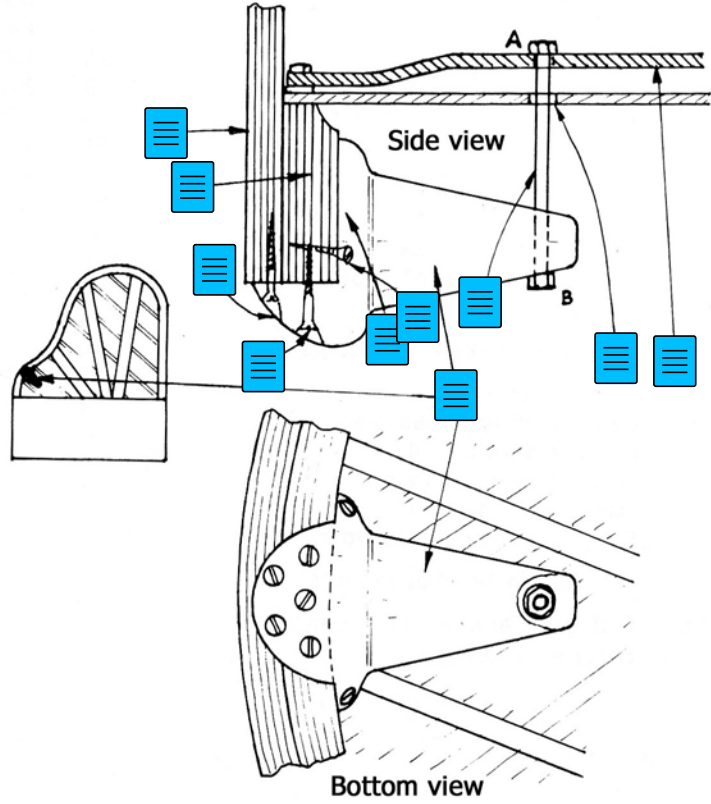


Details for Some Parts of Grand Pianos

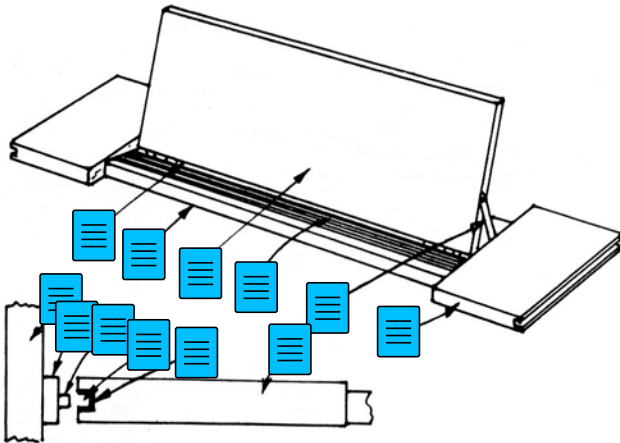
DUPLEX SYSTEMS



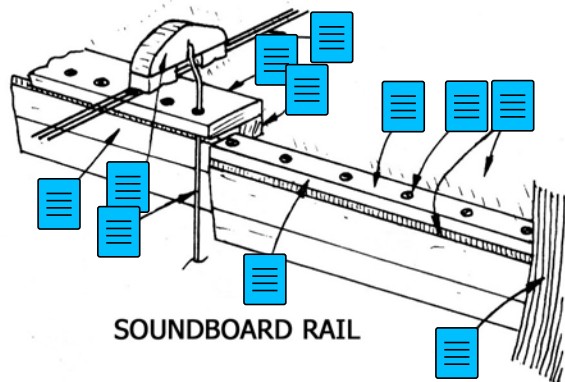
RIM-PLATE SUPPORT (BELL)



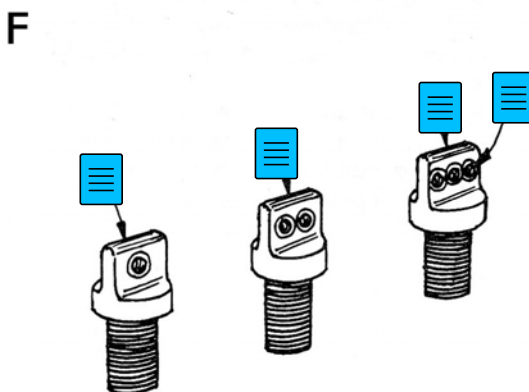
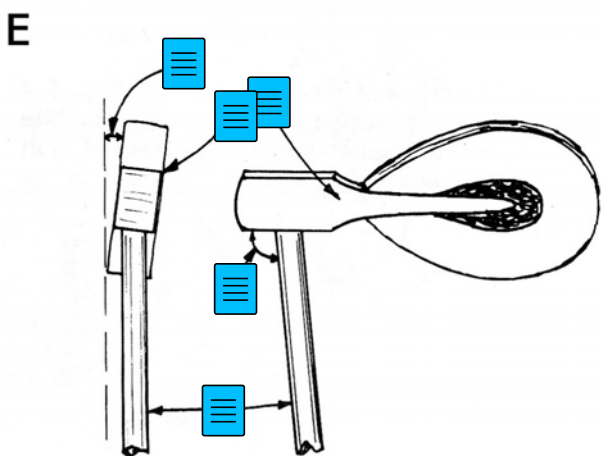
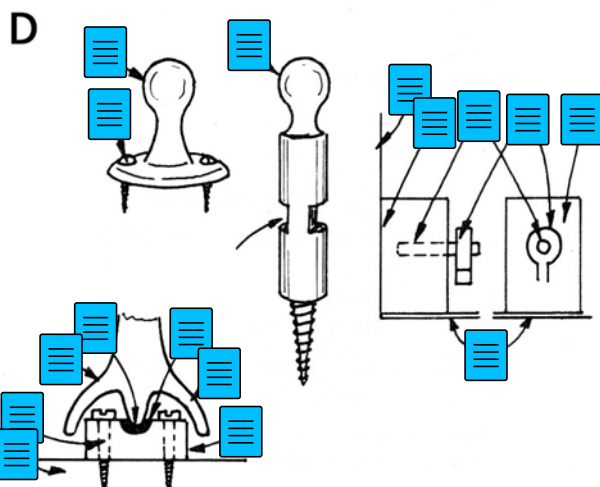
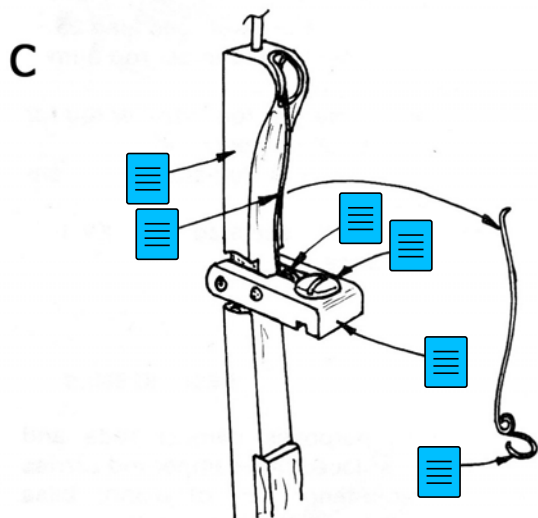
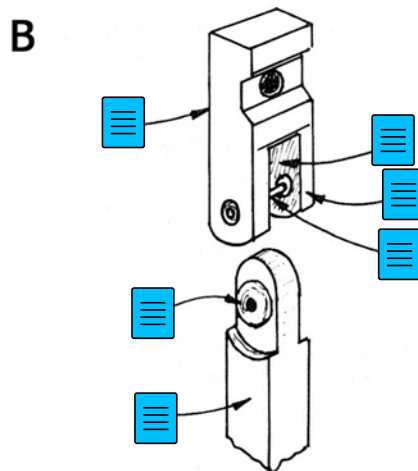
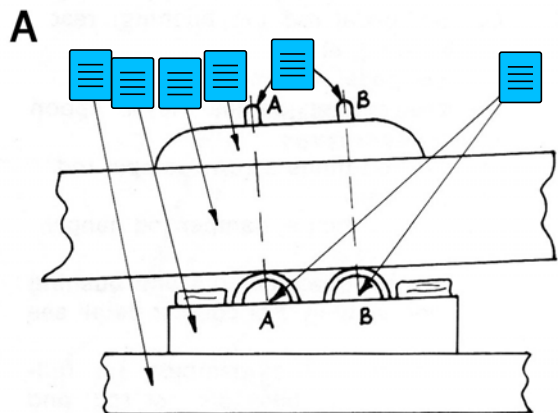
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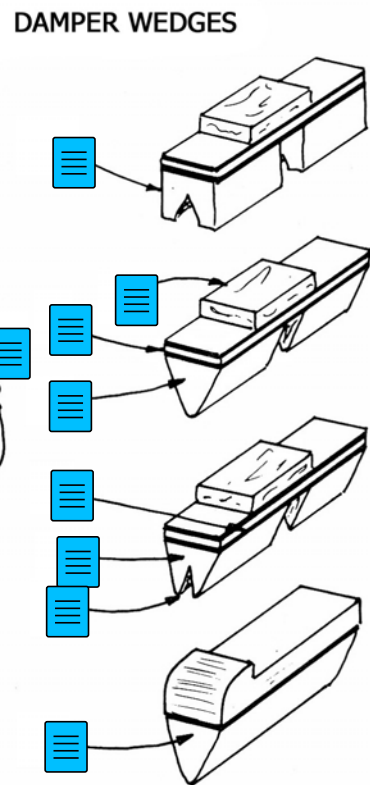
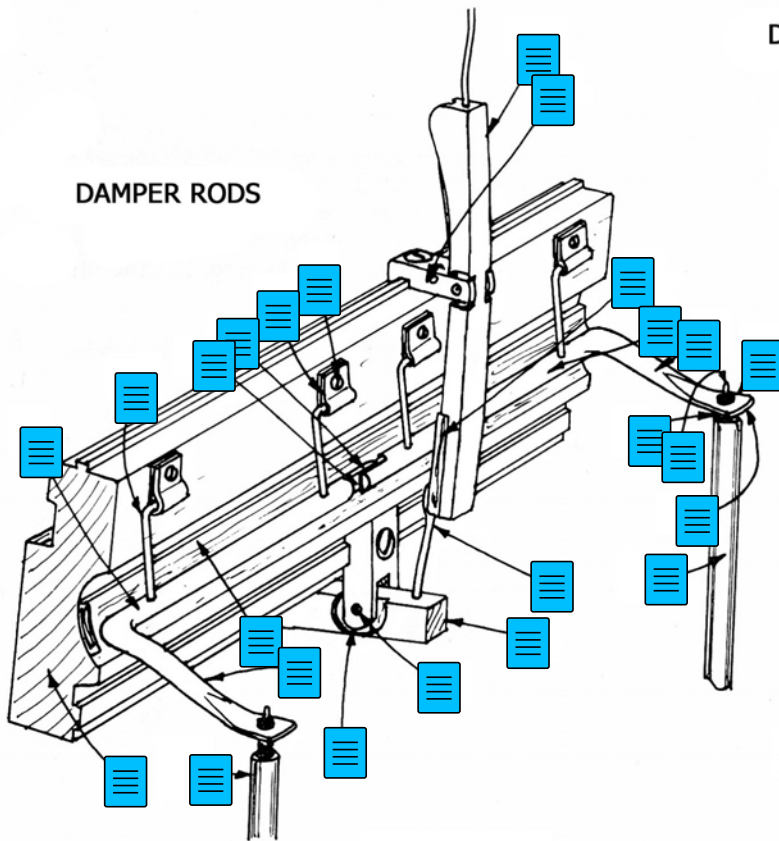
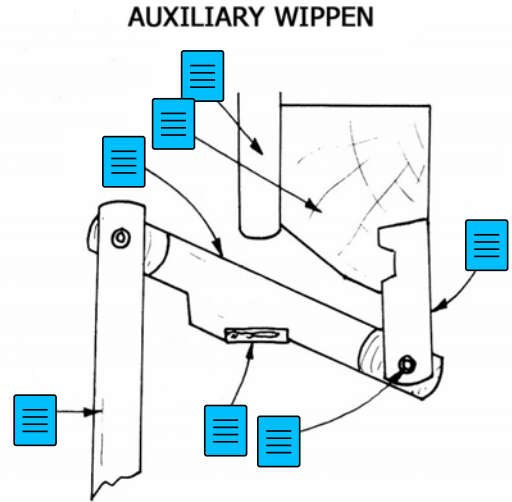
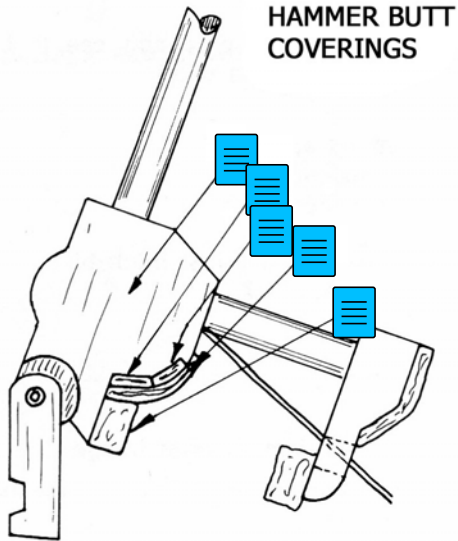
SOUNDBOARD RAIL



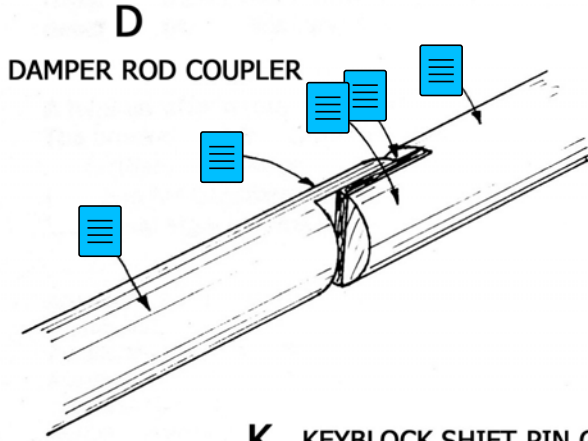
Miscellaneous



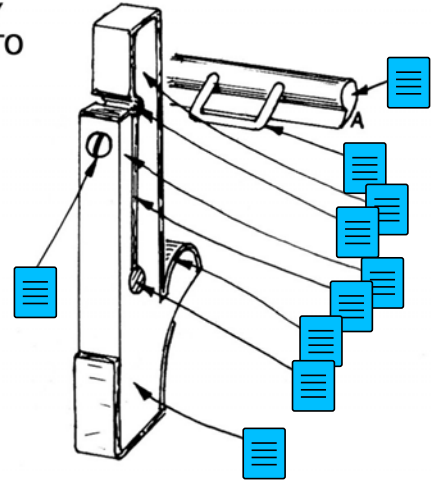
Various Action Parts



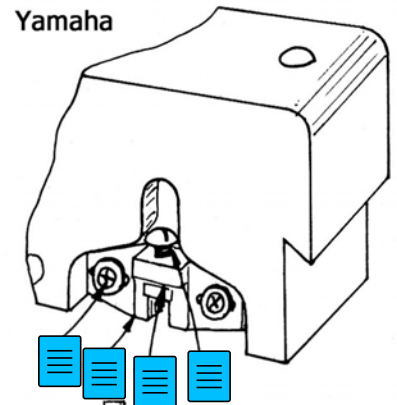
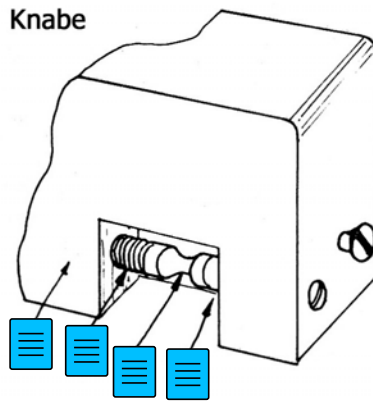
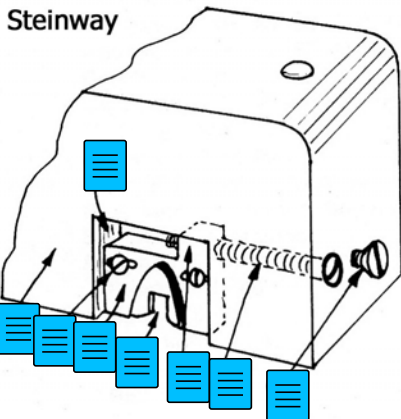
Miscellaneous Items



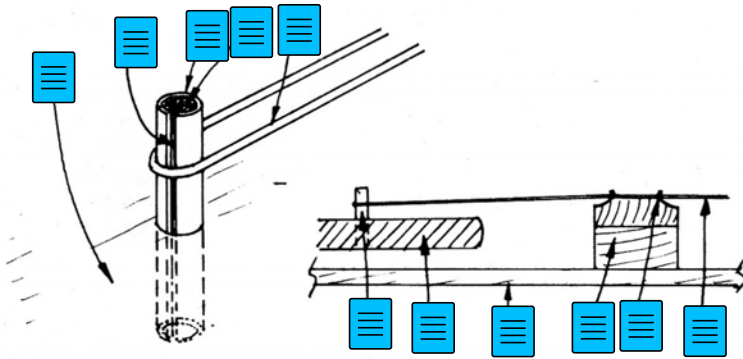
M
STEINWAY
SOSTENUTO
MONKEY



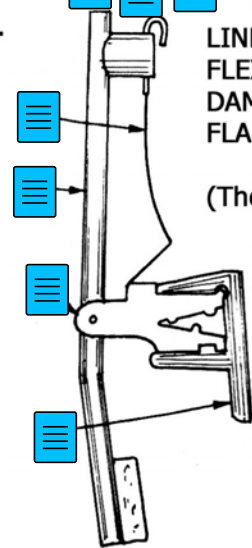
K KEYBLOCK SHIFT PIN GUIDE



A ACU-JUST HITCH PIN (Baldwin)



T
LINDER
FLEXIBLE
DAMPER LEVER
FLANGE
(Thomas Piano)



Index of Parts

Diagram numbers versus page numbers: While the pages of diagrams and their corresponding pages of parts-names have been numbered with Arabic numerals, this index directs the reader to those pages, not by the page numbers, but rather by the roman numeral assigned to each set of drawings and to the accompanying names-page.

If a part name is not to be found in this Index to Parts Names, the reader is asked to look in the Glossary. Space requirements made impossible the listing in the index of all parts (and functions) described in the Glossary.

Symbols:

A hyphen after a roman numeral means that the accompanying word refers to a general heading.

The bracketed Q.V. (Latin for "which see) means: turn to the word immediately preceding it for further information.

GI stand for Glossary and **GLAP** for Glossary Appendix.

The equal sign (=) means: turn to the term that follows it.

- Abstract: VII A. (See GI.) See also items under sticker.
- Accelerated action: XXIII A
- Acoustic disc: X 38, XX 12 (See GI)
- Dowel: XX 13
- Action: (See GI.)
- Bolt and bolt nut: V 47, 48
- Bolt hole: III 13, 20a
- Bracket: V 49, XV 30, XVI 46
- Bracket mount: V 50, 51, XXIII D, 19, 20, etc.
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- Lower rail: VII 2c
- Rail: V 10, XV 1, XXIV 43, XXV 46
- Rest bed: = support block (below)
- Standard: = bracket
- Support:
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- Bolt: I 5
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- Agraffe: XII 22, 51, XIII 17b, XXIII F
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- Aliquot: XVIII 10, XXII 7 (See GI.)
- Bar: XXII 2, 5
- String: XXII 1
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- Connector (or coupler) to bass damper rod: XXIV 37
- Anchor (string): IV 26
- Anti-node: XVIII 4 (See GI.)
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- Aperture (lock): IX 47
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- Fall: I 30
- Arm: II 10
- Cap: I 26
- Auxiliary whip (wippen): XXIV 9
- Action bracket arm: XXIV 6
- Auxiliary wippen spring: XV 2a
- Loop: XV 1 a
- Capstan contact cloth: XXIV 10
- Flange: XXIV 8
- Flange bushing & center pin: XXIV 11
- Flange rail: XXIV 7. See also under Rails in GLAP
- Sticker: XXIV 12
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- Back beam: XIII 9, XVIII 30
- Back board: II 28, IV 10, XXI 8
- Support rail: II 24
- Back cap: II 28
- Back check: XV 34 (See GI.)
- Block: V 46
- Felt: V 46a, XV 34
- Wire: V 46b, XV 34
- Back flange: III 30
- Back handle: II 25
- Back leg: = rear leg
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- Screw: II 31
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 Strip: XVI 4
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 Shank: V 14
 Skin: V 13
 Back top: I 40, IX 22
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 Lid: I 40
 Panel: I 40
 Back supporting beam: XI 19
 Balance hammer: British term for catcher
 Balance key pin: = balance rail pin
 Balance rail: VI 8, XV 46, XXIII 2
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 Button: VI 11
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 Balancier: XIV 9 (See Gl.)
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 Base: XII 38
 Bass block: III 3
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 top bridge: III 17
 Bass under arm: III 11, XII 4
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 Rod: XII 30
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 Bellyman felt: XII 47
 Bellyman strip: XIII 21
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 Hole: IX 47
 Housing: IX 49
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 Bottom: II 2, XXI 27 Bottom
 bar: II 1
 Bottom belly bar: XIII 5, XVIII 26
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 Bottom board: II 2, XXI 27
 Fastener angle: III 7
 Knob: I 7a
 Lugs: XVIII 17
 Bottom bridge: X 54
 Bottom panel: I 22
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Bridge: II 14, XII 35, XVIII 8, XX 14, 19, XXV 40 (See Gl.)
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 Gain: XX 11
 Notching XX 4, 5
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 Bridle wire: V 45
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 Bushing: (See Gl.)
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 Cushion: XVI 9
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Damper flange: short for damper lever flange
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Glossary

This Glossary aims to define many musical terms that enter the vocabulary of musically minded persons occasionally if not commonly. It seeks also to define numerous functions involved in a piano technician's care for the piano. Further, it endeavors to define numerous parts of a piano that need more than visual representation to make them readily understood by the reader. The *rails* of a piano are so numerous that they are often confused with each other; therefore it has been felt wise to consider the subject of rails in one unit, an appendix to the main Glossary. The so-called *winking* process also will be found separately as an appendix in order to avoid cumbersomeness in the main Glossary. *Tuning and reconditioned* are other terms expanded in the Appendix.

(The letters *q.v.*, Latin for quod vide, meaning *which see*)
(The letters **GLAP** stand for Glossary Appendix)

Abstract: The connecting rod, in a vertical piano mechanism, running between the wippen and the rear end of its respective key. It is also known as a **sticker**. An action (q.v.) built with this key-wippen arrangement is called a direct-blow action. A **reverse abstract** is required in a piano with a drop-action (q.v.).

Acoustical block: A wooden structural unit placed in the corner of the soundboard in a grand piano or in one or more corners of vertical piano soundboards to block vibrations out of those corners and thus minimize decay of tone. Other names for this wooden member are: **harmonic trap, barriers, eliminators, limiting bridges, dumb-bars.**

Acoustical disc: A wooden disc, usually maple, inserted in the soundboard between the rib and the bridge with a dowel running through the rib and the disc into the bridge to hold the three parts firmly together and help in the amplification of tones produced by vibrating strings.

Acoustical rim: That part of the rim of the piano involved in the acoustical block (q.v.).

Action: The system of lever trains between the hammers and keys of a piano whereby the finger movements at the keys are transferred to the hammers and dampers that produce tones from the strings and mute them, respectively.

Action entrance: The space in a grand piano between the keybed and the upper beam (or front rail) through which the action is inserted or withdrawn.

Acu-just pin: The name given to a hitch pin of tubular design on some Baldwin pianos. This type of pin permits adjustment of the height of the string at the point where it is attached to the plate. The setting of the eye or loop end of the string at a desired level facilitates obtaining a proper down-bearing (q.v.).

After touch: The distance a piano key moves (with diminished resistance) after the escapement (q.v.) of the jack is complete.

Aliquot: A part of a number that divides the number without a remainder. Musical wire vibrates in aliquot units. **Duplex scales** (q.v.) are of aliquot construction.

Amplification: Any process whereby the sound generation is intensified, particularly as a function of the soundboard.

Amplitude: The maximum width of the string of a string in segments of vibration.

Anechoic: Without echo; absorbing the maximum energy without returning energy to blend with subsequent reproduction.

Anti-node: The vibrating part of segments of a tautly stretched string in vigorous motion. (See **node**).

Back: The basic structure of the vertical piano, consisting of the soundboard, ribs, iron plate, wrest-pin block, strings, and posts (where used).

Back-check: A wooden or plastic block, covered with felt, against which the hammer tails on grands, and the **back stops** (q.v.) on verticals are caught in specific adjustment.

Back overlay: A wooden, felt, or cloth strip lying beneath the top board of some vertical pianos and above the pinblock and the tops of the posts.

Back-stop: A leather-faced projection from the hammer butt in verticals that makes an adjustable contact with the **back-check** to control the hammer rebound. The back-stops and back-checks are to be carefully distinguished from each other.

Balancier: A wooden part of the action in a grand piano more commonly known as a **repetition lever** (q.v.). The term is used mainly in connection with Steinway pianos.

Bar: See **Compression bar** (plate).

Bearing: The name sometimes given to the **Temperament** (q.v.), to **down-bearing** (q.v.), or to **side-bearing** (q.v.).

Beats: The sudden swelling or reinforcement of sounds occurring at regular intervals; the regularly occurring and periodically accented pulse or throb of strings not in phase. This out-of-phase condition, i.e., the existence of beats, takes place when one or more sets of **partials** (q.v.) in the production of sounds are coincident but differ slightly in their frequencies. The difference between the frequencies of vibration of any two such coincident partials is their beat frequency. The inducing of such beats at some points and the elimination of them at other points is an essential part of the tuning process.

Becket: A short, bent-over end of wire in the tuning pin coil of a piano string, designed to reach through the hole in the tuning pin and to serve as an anchor for the coil and that end of the string.

Bedding: The process of adjusting the keyframe to the keybed in grand pianos to achieve complete contact between these two large sections of the piano along all areas designed to touch each other. Proper bedding eliminates **knocking** (q.v.).

Bell: A bell-shaped metal structure approximately one foot long lying horizontally beneath the plate and soundboard near the curve of the rim at the treble end of certain grand pianos (models B and D, Steinway). A bolt extends upward from the small tip end of the bell through an aperture in the soundboard into the plate and is held in place by bolt nuts above the plate and below the bell. Flanges at the large end of the bell are screwed solidly to the top and inside areas of the inner rim, giving rigidity to this part of the piano which lacks the support of wooden braces normal to other areas of the rim.

Bellying: The process of creating a **crown** (q.v.) in the soundboard, gluing the soundboard to the back, and fitting the plate to the back.

Bellying press: = **Soundboard press** (q.v.)

Bellyman strip: See **Stretcher**

Bevel: The relieving of excess wood beneath strings as they leave the bridge pins. See **Notching**.

Binders: Sturdy wooden members designed to hold the several parts of the back assembly of the vertical piano as a solid structure. By a process of cutting notches in the ends of the posts (called gaining), the binders are fitted exactly into the posts so that usually the top and bottom binders remain flush with the face of the posts.

Bird-cage: See **Over-damper action**.

Blocking: A manufacturing process whereby **acoustical blocks** (q.v.) are inserted at soundboard corners to minimize unwanted vibrations. Also, the condition resulting in piano actions from poor regulation whereby proper **escapement** (q.v.) fails to take place.

Book matching: The process of removing sheets of veneer from their stack one by one and turning over the alternate sheets in a manner resembling the arrangement of leaves in a book, thus mirroring the grain pattern.

Boss: A slight enlargement within the plate made by the pattern maker and manufacturer in the area of nose bolt holes in plate bars or of lag screw holes in edges of the plate to offset possible weaknesses in the plate caused by the drilling of the holes.

Break: A division in the scale of the piano, such as the one between the bass bridge and the treble bridge.

Bridge: The wooden members over which the strings are stretched and which act to transfer the energy from the struck strings to the soundboard.

Bridle strap: A narrow strip of cloth that connects the wippen to the hammer-butt and holds the two main parts of the vertical action in their proper relationship and imparts light impetus to the returning hammer. It is also called **bridle tape**.

Burning hammers: The application of heat to hammer shanks by flame, heated air, or some type of contact-heat instrument to bend the shanks for **correction of the hammer angle**.

Burr: A tiny obstruction at mid-point of the hole in a tuning pin, caused by the drilling of the hole from both sides. Also, an unwanted obstruction such as that often found on a **capo-bar** (q.v.) producing a metallic buzz when a string is set in motion.

Bushings: The felt bearings found in the several friction points such as the swivel point of the hammer, the damper, the wippen, or the jack. The bushings may also be made of **teflon** (q.v.).

Butt: A major wooden element in actions of vertical pianos in which the hammer shank and the bridle strap are held and which is attached to the main action rail by a **flange** (q.v.).

Butt Plate: A small metal plate mounted on a hammer butt of some types of vertical actions, used to clamp the centerpin of the flange to the hammer butt. It is not to be confused with metal flange or flange plate. See **Flange**.

Cacophony: Noise (transliteration from the Greek).

Cant: The stagger of strings across the bridge of a piano.

Capo bar: Short for **capo d'astro**.

Capo d'astro: (sometimes capodastro, capotaster, capo tasto): A term of Italian origin meaning "head of the touch" or "head of the feel." In early usage as also in later times its reference is to a raised projection at the top of the fingerboard of a stringed instrument over which the strings pass and which defines their sounding length at that end. In a piano, it refers to a rigid, raised part of the plate over which the strings pass before reaching their respective tuning pins, thus determining their speaking length.

Capping a hammer: The process of resurfacing a worn hammer with a thin covering of buckskin or other durable material.

Capstan screw: A wooden, metal, or plastic connector between the unexposed end of a piano key and the heel of the wippen (q.v.). It is screwed or firmly fixed in the key end and generally has side perforations or flat faces by which adjustments may be made to eliminate or minimize **lost-motion** (q.v.).

Carriage: British term for **rocker arm** (q.v.).

Case: The wooden or furniture component of pianos, except the **back** (q.v.).

Caul: The slightly hollowed bottom part of the rigid frame used with **go-bars** (q.v.) to exert pressure for such a purpose as putting the crown in the soundboard of a piano. Also, the side supports for the hammer press, and sometimes for the work mold in the bottom part of that press.

Cent: A one hundredth part of a semi-tone of the equally tempered scale, or one-twelve-hundredth part of an octave.

Center pins: Cylindrical (usually brass) pins used in felt bushings at the several hinge points in piano actions. They are obtainable in twelve closely graded diameters for proper fitting.

Chamfer: A term for the **relieving** on the ends of the ribs (also known as **scalloping** the ribs). See **Bevel**.

Checking: Regulating the **back check** (q.v.).

Chipping: A rough tuning of pianos by plucking the strings with a "chip," usually a thin piece of hardwood. This process is largely confined to the early stages of manufacture and rebuilding where strings need to be raised in pitch before the action and keys have been installed.

Chromatic scale: The successive, semi-tone intervals in the twelve-tone music scale. In early notations, raised or lowered intervals (sharps or flats) were indicated in red; hence, coloring or chromaticism.

Chucking: The enlargement of a space in the key stick above the balance rail pin hole permitting a rocking movement of the key at the pin.

Clavichord: A popular predecessor of the piano. It, in turn, was preceded by the **monochord** (q.v.).

Closing in rail: See under **Rails** in GLAP.

Color: Shadings of difference in musical characteristics. See **Timbre**.

Comma (or coma): A minute interval or difference in the pitches of the same musical tone occasioned by different systems of tuning. The **comma of Didymus** is an interval such as that between two enharmonically equivalent notes like B-sharp and C-natural, an amount of 24

cents. The **syntonic comma** is the interval between a just major third (5:4) and a Pythagorean third (81:84). The **comma of Pythagoras** (known also as the **ditonic comma**) is the difference between a cycle of just fifths and seven perfect octaves. In equal temperament tuning this comma is absorbed by the diminishing of each successive fifth in the cycle by the amount of 1 / 12th of the comma.

Complex tone: A sound wave produced by a combination of pure tones (sinusoidal) of different frequencies.

Compression: A local increase in density (as in sound waves). See **Rarefaction**.

Compression bar: A manufacturer's term for what is generally known by the shorter words **brace** or **bar** (longitudinal) in the plate of a piano. To differentiate the several bars, from bass to treble sides, the term is preceded by such words as bass, cross-brace, tenor, treble, and extreme treble for the narrow end of the plate.

Compression felt: The inner layers of hammer felt which are forced into a relatively hard mass by the tension of the outer layers (see **Tension felt**).

Compression ridge: A surface swelling created by excessive pressure, as in the soundboard or in the case-veneer of a piano.

Concert grand: The largest grand piano, standardised at about nine feet.

Concord: Intervals without beats as required in octaves; perfect harmonic relationship, e.g., without characteristic beats of dissonance.

Condensation: Water deposits produced on various parts of a piano by a drop in temperature when a measurable degree of humidity prevails. Also, like **compression**, the opposite of **rarefaction** (q.v.).

Console: A contemporary small vertical piano generally having direct-blow action; usually from about 40 to 42 inches in height.

Consolette: A vertical piano of a size between spinets and consoles, ordinarily around 38 inches in height.

Core print: An imprint left in the plate-making process by a block inserted in the mold so as to leave a space, after the pouring, between the bass bar (or brace) and the flat part of the plate to permit certain strings to pass under the bar in a straight line from the bridge pin to the hitch pin. The block is put in position after the sand mold has been made (and will later be removed) so that the molten liquid when poured will not fill this needed space.

Cornice: See final paragraph under **GLAP Rails**.

Coupling: Two or more acoustical systems connected to work as a unit. Also, a connecting unit by which two damper rods lifting dampers for two different sections of the strings in a piano may lift all dampers at once. See under **Dampers** in Index to names of piano parts.

Crown: The spherical curvature of the soundboard with normal radius about 61 feet. This arch is the resistance on which the strings must work for optimum performance. The term is also used to designate the shape of the striking end of the hammer.

Cycle: See **Hertzian waves**.

Cymbalom: A modernized dulcimer; a horizontal, rectangular, steel-stringed instrument played with hand mallets that have different densities of materials for the characteristic timbre

produced. It has pedal-operated dampers in modern production.

Damper: A part of the piano action that is pressed against a string unison when its corresponding key is released to extinguish its tone. It consists of a felt-covered wooden block that should pull away from or press back against the string when the hammer is about half way through its movement to and from the string. For **damper regulation** see **Regulation**.

Decal: See **Decalcomania**.

Decalcomania: The process of transferring to wood, metal, glass, etc., decorative designs and/or name plates printed on specially designed paper. Also, the design or name plate itself, generally shortened to **decal**.

Decay: The gradual loss of volume in tones emanating from a musical instrument.

Decibel: A unit for measuring the intensity level of a sound—abbreviated *db* (without a period).

Desk measurement: The distance from the front of the cross block (or bottom belly board) to the front edge of the keyframe, considered by the manufacturer to be a critical measurement in the grand piano.

Diaphragm: A vibrating membrane, such as a piano soundboard, which should have a rigidly fastened reflecting perimeter.

Diapason: A Greek word (through all) originally meaning concord through all the tones. In general it is used for the entire compass of musical tones. More frequently it is used in a particular sense signifying: 1) one of the two foundation stops in the organ, extending through the complete scale of the instrument; 2) a standard of pitch to which all tones of a musical instrument conform or with which musical instruments in general are in accord; 3) by extension, an implement such as a tuning fork or pitch pipe by which that standard is applied to the instrument; 4) any full-throated sound embracing a vast complex of tones and overtones.

Diapente: An ancient Greek word for the consonance of the fifth interval; the ratio is 2:3.

Diatonic: The most frequently used scale in music; it is composed of two tetra-chords. Also, music confined to notes that are proper to the signature of the key in which they occur.

Dip: The depth of the downward travel of the keys. Measuring at the front edge of a white key or sometimes in line with the front rail pins, it is usually about three-eighths of an inch.

Dissonance: The inharmonious sound occurring when intervals are out of absolute harmonic relationship. All intervals in the equally tempered scale, except the octaves, produce their respective dissonances; for example, the tenth interval is fourteen cents sharper than the justly intonated tenth.

Ditonic comma: See **Comma**.

Dome: A term used by a few manufacturers for the raised portion of the plate around a lightening hole. It also has an adjectival use—dome hinge—designating the hardware item that holds the music panel to the piano.

Double-overstrung: See **overstrung**.

Down-bearing: The deflection of the string toward the soundboard as it crosses the bridge.

Down travel-weight: Another name for **down-weight** (q. v.).

Down-weight: That amount of weight (usually measured in grams) required to depress a key

from its rest position to (but not through) the point of **let-off** (q.v.) with damper disengaged. The weight is placed on the front end of the key, and the action is jarred lightly with the heel of the hand to offset the static friction within the action, allowing the key to depress slowly to the point of escapement of the jack.

Drop: The distance through which the hammer of a grand piano drops during escapement of the jack from the knuckle.

Drop-action: The arrangement in a vertical piano, generally a spinet, whereby shorter keys than in direct-blow actions make key-wippen contacts by use of **reverse abstracts** (see **abstract**). This method of construction provides a proper **striking point** (q.v.) of hammers on the strings while allowing the keybed to stand at the normal height of approximately 28 inches from the floor.

Drop-screw: The adjusting screw in a hammer flange of grand pianos that limits the height to which the repetition lever can rise.

Drumming off: A term used in **laying touch** (q.v.) by depressing three to four keys at a time with an even touch to obtain uniformity in the relationship between back checks and hammer catchers.

Dulcimer: A horizontal, rectangular, steel- and brass-stringed instrument played with hand mallets. It has one or sometimes two bridges made with bridge-like pillars to permit strings to pass through them. Also, a three (or more) string guitar-like instrument indigenous to the Appalachian Mountains.

Dumb-bars: See **Acoustical block**.

Dummy damper: An extra damper lever, in certain pianos, lacking damper wire and damper head. It is generally found between the bass and tenor dampers. Its purpose is to hold the damper lift rod away from the rest of the damper levers when they are in their "at rest" position.

Duplex scales: When a piano string is set in vibration, partials or overtones are produced simultaneously with the fundamental tone. It is known that the quality of sound emerging from an excited string can be improved by adding strength to a certain number of these partials. Accordingly, some piano manufacturers have divided off the rear waste ends of the strings in the treble end of their instruments in lengths representing an **aliquot** (q.v.) part of the speaking length of those strings. In the higher treble sections of the piano, where strings are less pliable because of their shorter length, the front or keyboard ends of the waste strings have also been similarly divided. Structural modifications of the plate permit these separated portions of the strings to vibrate by themselves so that actually three distinct parts of each string vibrate in harmony with each other. The inventor (Steinway) has given the patented name "duplex scale" to this alteration of plate and wire, describing its function as follows: "The front duplex scale assists mechanically in a more rapid subdivision of the usual speaking length into its segmental vibrations, strengthening the harmonic partials. In addition, the rear duplex scale vibrates in sympathy with its corresponding partial tones (in the main portion of the string), thus producing overtones that lend brightness and color to the fundamental tone."

Enharmonic: A term, in reference to intervals in music, indicating tones having the same sound in a tempered scale but carrying different names in musical notation; e.g., D flat and C sharp; also, the diminished 7th chord which can be written in four or more different ways. **Enharmonic modulation** occurs when one or more notes of a chord are enharmonically altered so that a new harmonic relation among the notes of the chord leads into a new key.

Enharmonic diesis: The difference between three conjunct major thirds and an octave (ratio 125:128).

Equal temperament: The contemporary system of tuning fixed-tone musical instruments by division of a controlling octave into twelve theoretically mathematically-equal musical intervals. This process involves a necessary deviation from pure harmonic relations amongst the intervals of the octave.

Escapement: A mechanism by which a cyclical movement is created; in pianos, the application of a lever that voids the blocking of a hammer against its respective string(s) and permits the hammer to repeat its stroke. See, also, **let-off** in both Glossary and Nomenclature Index.

Expansion-joints: See **Relief cut**.

Fall apron: See **Fallboard cover**.

Fallboard cover: The fallboard in some pianos swings within or pulls out from a hollow space. The wooden panel above it and enclosing it is generally known as the fallboard cover or the fall apron.

Fifth: See **Interval**.

Filing the hammers: See **Hammer reconditioning**.

Fin: See **Nose**.

Flageolet tone: In stringed instruments, a clear high-pitched tone resulting from the touching of a vibrating string at a particular point; e.g., such a string touched at the center of its speaking length produces a sound one octave higher than its normal pitch. The tone doubtless derives its name from its quality of sound resembling that of the flageolet (flute).

Flake: A wood product sometimes used in lower priced pianos as corewood for certain sections of the instrument such as the bottom panel. It is also called chipboard.

Flange; A small unit in piano actions, used specifically to hinge such parts as the hammer, damper and wippen to their respective rails. When made of metal it is also known as a flange plate.

Flare: The distance a key departs from a straight line drawn from the center of the capstan screw hole parallel with the covered part of the key. The distance from this line to the nearer side of that part of the key is the flare measurement. See *Index to Diagrams*.

Fletch: A quantity of sheets of veneer produced by cutting from a half-log.

Fly or fly-jack: See **Jack**.

Fly finishing: A manufacturer's term for the final assembling of all separately constructed parts of the piano.

Format: Complex sound has a frequency range in the sound spectrum within which the partials have relatively large amplitudes; the central frequency of the format region is called the **format frequency**; and the range itself is the format.

Fourier's theorem: A French mathematician, Fourier (1768-1830), theorized that every complex vibration can be reduced to a series of simple pendular motions that are the harmonic structure of the musical string in action. Subsequent observations have shown that the harmonic substructure of musical strings in vibration does not remain static but is constantly

resolving into simpler structures with fewer and fewer higher harmonics, thus becoming more pleasant with less enharmonic relationship.

Fourth: See **Interval**.

Fractionals: A synonym for harmonics as musical strings vibrate in discrete fractions of their lengths in aliquot parts.

Frequency: The number of sound waves per second produced by a sounding body such as a tuning fork or a piano string in vibration.

Front beam or front cross rail: See final paragraph under **GLAP Rails**.

Full-bent rim: See **rim**.

Fundamental: A term indicating the lowest component of a complex vibration. In piano nomenclature it is the first partial of a vibrating string. It is also known as the **generator tone**.

Gauge: Any of several unique standards of measure in pianos, e.g., music wire gauge, center pin gauge, tuning-pin gauge. Also, gage.

Generator tone: See **Fundamental frequency**.

Go-bars: An array of flexible wooden bars about five feet long that can be forced within a rigid frame to exert strong pressure for such purposes as the gluing of a bridge to the soundboard, or of the soundboard to its ribs to obtain a proper crown (q.v.).

Grand: The descriptive name applied to the wing-shaped horizontal piano of many sizes. The corresponding words in some other languages are: *flugel*, German; *royal*, Russian; *piano a queue*, French; *piano a coda*, Italian; *flygler*, Norwegian.

Hammer: A felt mallet at one end of a shank with a flange at the other end to allow the mallet to swing towards its respective string or unison of strings. Hammers are graduated in size and weight.

Hammer-blow: The motion conveyed to the hammer, through the **wippen** (q.v.), when its respective key is struck; the distance between the hammer at rest and the string(s) it is designed to strike, generally between 1-5/8" and 1-7/8".

Hammer-butt: The wooden swivelled unit in vertical pianos into which the hammer shank is fitted.

Hammer-reconditioning: The process of using needles, files, pliers, liquids, etc., on hammer felts to improve the tonal qualities emitted by the struck strings. Altering the shape of the hammer felt by use of sandpaper or other roughened substance is often called **filing-the-hammer**. **Carding** and **buffing** are corresponding terms in Canadian usage. Pressing the surface of the hammer with a heated metal tool is often called **ironing-the-hammer**.

Hammer rise: The slight upward movement of the hammer from the **back check** (q.v.), after release of finger pressure from the key, to allow the **jack** (q.v.) or fly, in a grand piano wippen to resume its normal position under the **knuckle** (q.v.).

Hammer-spacing: The adjusting of hammer-shank flanges to make the hammers at rest lie at approximately equal distances from each other within their respective sections of the piano action.

Hammer striking distance: See **Hammer blow**.

Hammer travelling: An abbreviation for hammershank travelling or, better, travelling hammershanks. See **Travel**.

Hammer weight: A hammer is made from a sheet of felt approximately 36½ by 38½ to 42 inches in length. The weight of the sheet gives the weight ascribed to the individual hammer, e.g., a hammer bearing the weight number of 15 lbs. has been cut from a sheet of felt weighing that many pounds; or, the whole set may carry that weight number.

Harmonic: A component tone produced by a vibration frequency which is an integral multiple of the vibration rate producing the fundamental. Compare: **partials** and **inharmonic**ity.

Harmonic trap: See **Acoustical block**.

Harpichord: A long, wing-shaped, metal-stringed musical instrument that produces its tones by the plucking of its strings with hard leather or plastic points (originally crow-quills) set in jacks operated from a keyboard and capable of gradation of tone only by manipulating keyboard stops or levers.

Head stamp: A piano manufacturer's term for a keyboard marking to indicate the exact layout or division of the keyboard for natural and sharp keys for any particular model of piano.

Hertzian waves (generally abbreviated to **Hz**): One complete vibration of a sounding body, sometimes expressed as a double-vibration and often represented as cycles per second.

Horn: See **Nose**.

Hygroscopic: A Greek word for moisture indicating a unique ability to absorb or draw moisture from the air.

Impact tuning hammer: A spindle-headed tuning hammer with a built-in lost motion of approximately 30 degrees and with a heavily weighted arm or handle. It calls for a loose-wrist impact motion with a firm grip at or near the head of the instrument rather than a strong arm motion of pulling or pushing farther up the handle as in the standard solid type of tuning hammer. This relaxed hand-wrist movement near the tuning pin allows the heavier part of the pin-turning action to be borne by the free-swinging mass at the outer end of the handle. The instrument is designed to reduce the energy required of the piano technician and to minimize the torque (q.v.) in the tuning pin during the tuning process.

Inharmonicity: Deviation of the frequencies of partial tones in a piano string from their theoretical values in an ideal flexible string. Inharmonicity is due mainly to the stiffness of the string material, which tends to accelerate the restoration of the deflected string, making it vibrate faster than it would if the restoring force came solely from the string tension. Inharmonicity is greater in the higher partials of strings, varying approximately as the square of the partial mode number. Since tuning of intervals involves matching of coincident partials of strings having different fundamental pitches, it is obvious inharmonicity has a definite effect on the tuning results, as exemplified by the inherent stretching of octaves from bass to treble. (See also **Stretched Octave**.)

Instars: Newly hatched moth larvae.

Intensity: The degree or amount of strength, force, or energy applied to an object; the piano's capacity to produce a maximum range of musical sound.

Interference: The result of two sound waves of slightly different frequencies meeting each other. Beats are the audible aspect of such interferences.

Interval: The distance from one tone to another. Intervals are reckoned on the music staff from a lower note to a higher one. The major scale is the accepted standard by which intervals are measured. An interval takes its name from the number of staff degrees it covers: second, third, fourth, fifth, sixth, seventh, octave. In the series of harmonics there are three perfect consonances. In terms of frequency of vibrations of the higher tone to the lower, their ratios are: Octave 2:1; fifth 3:2; fourth 4:3. There are four imperfect consonances: the major third in the ratio of 5:4; the minor third 6:5; the major sixth 5:3; and the minor sixth 8:5. Major and minor seconds and sevenths and all augmented and diminished intervals are dissonances. An interval less by one half step than the major of the same scale name is called minor; one greater by one half step than a perfect or major interval is called augmented; one less by one half step than a perfect or minor interval is called diminished. In the tuning of piano strings there is a deviation from the pure intervals described above. See **Intervals, Inharmonicity, and Equal Temperament**.

Intonation: The singing or playing of musical tones according to the aural perception of the prevailing standard of accuracy in pitch.

Ivories: The historical covering material for surfaces of the white keys; plastics now largely take their place.

Jack: A small, L-shaped wooden part of the wippen (q.v.) that transmits the motion of a struck key to its respective hammer through the knuckle (q.v.) on the hammer-shank in a grand piano, or through the hammer-butt in verticals. Following the striking of a key and after the key has risen part way to its normal position at rest, spring action returns the jack to its original resting place in readiness for repetitive sounding of the same note. The word **fly** is often used interchangeably with or in front of the word **jack**; but some manufacturers use the term **jack** for this unit in upright pianos only and employ the name **fly** exclusively for the corresponding unit in grand pianos.

Jack retaining rail = jack stop rail: See **GLAP Rails**.

Janko keyboard: The most outstanding of numerous attempts, before and around the turn of the 20th century, to alter the arrangement of keys in a piano to conform more closely with the key-relationships involved in equal temperament (q.v.). This keyboard, invented 1884-1886 by an Austrian named Paul Janko, comprised two ranks of keys all of the same size and shape (tripled into six ranks by exact duplication giving three different striking points for each key). Successive keys on both ranks play tones a whole note apart, but the second row from the bottom is pitched a half note higher than the bottom row and is shifted a half-key space to the right, thus permitting the keys of the second rank to serve as sharps and flats for those of the first or lowest rank. See, also, **six-six keyboard**.

Just scale: The mathematically precise musical scale of the diatonic and chromatic scales by which the intervals are in consonant accord with the harmonics of the fundamental.

Key: A term in music notation according to which the tonic note in a series of notes is used to designate that series, e.g., the key of C or the key of G. The word is used, also, for any one of the members of the keyboard, naturals or sharps, which, when pressed down, activates its corresponding part of the action, first through the capstan and subsequently through the train of levers and the hammer, for the striking of its respective string(s).

Keybed: The basic structure underlying the keyframe (q.v.) which, in vertical pianos, is attached to it by screws. In grands, it is the solid foundation on which the action (including the

key-frame) moves when the action (q.v.) is removed or replaced or when the shift pedal is employed. Keybeds are formed in several ways. One type is made from solid, one-length stock or from a number of separate one-length strips finger-spliced and glued edge to edge. Another type is made of two long strips called stiles, separated by short cross pieces entirely filling the space between the stiles and fitting into them by a tenoning process to obtain evenness and rigidity in the key bed. Still another type is made of rails and of stiles that are separated from each other in various panel-stile combinations.

Key-dip: See **Dip**.

Key-easing: The process of removing sluggishness in key response by properly sizing the keyholes over the front rail pins or in the buttons over the balance rail pins, or by altering the position of the pins themselves.

Keyframe: The wooden framework and lower foundation for the keys and action, composed of back-rail, front-rail, and balance rail with their respective pins, on which the keys are assembled in consecutive order.

Keyframe buttons: Threaded studs with large, flattish, smooth heads. Inserted through the grand plate keyframe balance rail from beneath, they serve as adjustable bearing points for the balance rail on the keybed. Also called: **gliders; balance-rail studs; slide bolts**.

Key-height: The distance from the top of the keybed to the top of the key, generally to the top of the key-covering but with numerous exceptions in the method of measurement such as those appearing in a piano technician's action hand book.

Key-leveling: The process of obtaining even alignment of keys in a piano, chiefly by proper placement of closely graduated punchings of felt, cardboard, and paper over front rail and balance rail pins. In a few instances alignment can be affected by adjustment of screws from beneath the keybed.

Key-set: A term used in the installation of the keyframe during manufacture to obtain proper relationship of the keys with the keybed and the action.

Key-stick: The name used for the carefully shaped wooden unit which, with its fittings, imparts the motion of the piano player at the keyboard to the wippen to bring about the striking of the hammer against the string(s). The shorter word **key** is more commonly used, especially when the fittings are included.

Knocking: Noises occurring when the keyframe is improperly adjusted to the keybed; they are generally removed by sanding of the bottom of the keyframe at its front edge, or sometimes by adjusting the balance rail studs (glider buttons or slide bolts).

Knuckle: The part of the grand hammer shank containing a small rectangular piece of rosewood (sometimes called the core, or insert) covered with a special density felt which in turn is covered with buckskin. It is also called **roller** and sometimes **barrel**. Also, used occasionally for that part of the string which begins to bend around the tuning pin to form the coil. It is at this point that the string often breaks in the tuning process.

Laying touch: The making of adjustments throughout the whole keyboard to bring all keys into proper relationship with one another and with all moveable parts of the action with which they are in either direct or indirect contact. When the proper key height has been established and the keys have been levelled, it is necessary to obtain the proper key dip recommended by

the manufacturer. Lost motion is then removed; damper rise, let off (q.v.), and drop (q.v.) are set to occur at the proper moment to the correct degree; and backchecks are evenly set to catch the hammers after keys have been struck. A drumming-off (q.v.) process is then employed to see that the key dip is uniform, after which all key-related measurements are rechecked to assure or bring about an after-touch (q.v.) sufficient for the avoidance of a too shallow dip and inadequate repetition.

Leads: The lead weights inserted in piano keys at the factory and meticulously located in the more highly respected instruments to obtain the desired amount and uniformity of touch-weight (q.v.). Their omission is common in inexpensively constructed pianos.

Let-off: A closely adjusted discontinuance of contact between the top of the jack and the knuckle (Gr) or hammer butt (Ver) to prevent blocking of the strings during a hammer-blow. It occurs at a critical point in the depression of a key with a detectable release of pressure at that point followed by the aftertouch (q.v.). See also **escapement**.

Liberty strip: See **Damper up-stop rail** under **Rails** in GLAP

Limiting bridges: See **Dumb-bars**.

Listing cloth: A British term for the cloth or felt used to minimize vibrations from the string wastes, those portions of the strings beyond the speaking lengths.

Loop: A word sometimes used to designate what is more properly called an anti-node (q.v.). An eye made in the end of a string at the hitch pin end.

Lost motion: The lag due to looseness between the driver and the follower in a mechanism. In a piano it may occur at any point where one moveable part transmits energy to another moveable part as in the use of pedals or keys. In the depression of these parts of the instrument, lost motion is felt as a brief period of movement to no avail before contact of the two moveable parts has been established. Regulatory procedure calls for minimizing the distance between the two connecting parts.

Lyre: The complex of posts, rods, braces and pedals in a grand piano, suspended below, separable from, and secured with screws to, the underside of the keybed.

Marpurg's Temperament "I": A closed system based on $1/3$ ditonic comma (see **comma**). Instead of narrowing each fifth by $1/2$ ditonic comma, as in equal temperament, Marpurg's temperament produces a circle of fifths by compromising only three fifths by $1/3$ ditonic comma.

Meantone temperament: A system of tuning keyboard instruments used before the adoption of equal temperament. It is based on a standard interval of a mean tone between a major and a minor whole tone of just intonation (see just scale). A notable result of this method of tuning is that all major thirds are tuned pure.

Mode: A scaled arrangement of the eight diatonic tones of an octave according to a fixed scheme of intervals. The tonic can be any note within the octave range; and the mode is named according to the name of that tonic.

Monochord: A Greek work meaning **one string**. The name was applied to an ancient instrument in which a string was stretched over a soundboard, and a moveable bridge was set at any given point, permitting the string to produce characteristic tones of the subdivisions of the string. Later, other strings were added, but the simple instrument maintained its original name. When the number of strings was increased, the bridge was integrated with the soundboard, and the

instrument, with the addition of keys, became the clavichord.

Musicologist: A specialist in the academic aspects of music; not necessarily a performer on any musical instrument.

Mute: A strip of felt, rubber, leather, or some energy absorbent material used to reduce certain tones on a piano, permitting other tones to dominate so that they can be tuned; also, a single such wedge.

Needling: The use of a set of needles mounted in a handle to alter slightly the density of the felt covering of hammers.

Nipple: A name sometimes used for **becket** (q.v.).

Node: A Latin word meaning **knot**. One of the points of a vibrating string that divide the string into segments of vibration. The nodes number one less than the segments. (Common usage includes the terminals of vibrating strings as nodes, in which case the nodes number one more than the segments.)

Noise: Any undesired sound, usually erratic, intermittent, or statistically of random oscillation. Also, any sound, however musical that is unwanted because it is out of place or distracting.

Nose (plate): A downward projecting flange at the crossing point of the bass and tenor (or cross) bars on the underside of the plate of a grand piano, designed to transmit to the case through the struts (q.v.) of the wooden under-frame a part of the stress created by string tension on the plate. It also provides support for the cross block or belly bar to offset its natural tendency to lean forward and thereby reduce the bridge bearing through a drop in the crown. To insure a tight connection between the nose and the belly bars a wedge is firmly forced up between them from underneath. In a smaller grand this wedge is held in place by glue and screws (being of wooden substance). On larger grands it is made of metal held in place by friction or by a metal flange and screws. The nose is also known as **fin** or **horn** (i.e., wedge horn).

Nose-bolt: A broad-base bolt screwed into a brace (strut) of the wooden underframe of a grand piano and extending upward through an aperture in the soundboard to provide a shoulder for the underside of the plate. A threaded, narrow, spike-like part of the bolt then protrudes through a **nose-bolt-hole** in the plate, permitting a **nose-bolt-nut** to be firmly screwed down upon its upper side. The factory setting of this bolt normally should never be disturbed except when resetting the plate, at which time careful adjustment must be made from underneath the piano, usually with light and mirror, to obtain firm but nonpressured contact between the shoulder of the bolt and the plate. Tightening of the nut on the upper side then holds the plate firm, resisting the upward tendency created by the string tension.

Notching: Cutting notches in soundboard bridges. Also, tuning by very short nudgings of the tuning hammer.

Note: The conventional sign used to indicate pitch (q.v.) or duration of sound or both. It should not be used to designate tone (though it is frequently used in that manner).

Octave: An interval embracing eight diatonic degrees; an interval between any two tones whose ratio is 1:2. Also, the harmonic combination of two tones whose ratio is 1:2. The interval of an octave contains 1200 cents - see **cent**. Also, see **Interval**.

Oiling-off: The manufacturer's final touch-up of a piano case before shipping.

Oscillation: The single swing from one extreme to the other in a vibrating body such as a musical string; a half-vibration (there are 880 oscillations within the vibrations that produce A-440 Hz).

Oscilloscope: An instrument in which the variations in a fluctuating electrical quantity appear temporarily as a visible wave form on the fluorescent screen of a cathode ray tube. (Webster)

Overdamper: A second damper an inch or more higher than the normal damper in some verticals, usually on strings immediately above the bass break where damping problems frequently occur.

Over-damper action: The name used in Great Britain for an obsolete European piano mechanism in which damper wires are looped over the hammer heads. In North America this is generally called a **bird-cage action**.

Overstrung: A condition in which the strings of a piano are arranged radially in two layers, the treble below the bass, to provide the greatest possible length of strings within the potential diagonal of the bass section. This arrangement also permits the bridge to be placed in a highly sensitive position on the soundboard, thus yielding greatly improved tone quality and power. A musician by the name of Pape initiated this method of stringing in 1828, but its serious application to squares and grand pianos was undertaken by Henry Steinway, Jr., in New York in 1855. Some makes of pianos have triple layers of strings, bass, tenor, treble. The piano is then said to be **double-overstrung**.

Overtones: The upper partial tones of the harmonic series; the term should not be used in technical discussions.

Papering the flange: See second item under **Shimming**.

Partial: Any component of a complex tone; synonym for harmonic or fractional; an aliquot tone. The members of the harmonic series that form the constituents of a musical note are **partials** of that note.

Pedal: A lever operated by the feet, such as that for controlling the dampers.

Percussion instrument: A musical instrument sounded by striking, the piano included; however, all techniques at the keyboard should not be percussive.

Period: The time required for one cycle of a rhythmic motion; the measurement is noted in seconds in musical vibration. In musical composition, a period is a group of measures, usually eight or sixteen, arranged in two phrases and forming a complete statement ending with a cadence.

Phase: A term in physics meaning, in relation to the piano, a particular stage or point of a sound wave in a recurring sequence of movements as in vibrating strings. The distance whereby one set of waves is in advance of another is called the difference in phase.

Pilaster: An ornamental strip of wood usually attached to the front edge of the side (or end) of an upright piano and often supporting the swinging upper front moveable panel.

Pinblock: The wooden plank designed to hold the tuning pins of the piano. It consists of laminations of carefully selected wood with particular friction ability to enable the tuning pins to resist turning.

Pinblock core: The thin layers of wood constituting the main body of the pinblock. They are rigidly glued together with the grain running alternately in different directions to provide

maximum friction for the holding of the tuning pins.

Pinblock restorer: A name, in questionable use, for hygroscopic fluids applied to the pinblock to increase the friction of tuning pins. See **pin-tightener**.

Pin-tightener: Any one of a number of materials such as liquids, metal sleeves, sandpaper, etc., used to increase the friction of the tuning pin in the pin-block. Liquids so employed are designed to swell the wood fibres surrounding the tuning pin by drawing in moisture from the atmosphere and holding it there for a considerable length of time.

Pitch: That property of a musical tone determined by the frequency of vibrations of the sound waves that strike the ear. The larger the number, the higher the pitch. **Absolute pitch** is widely attributed to a person who can identify a heard frequency immediately with great accuracy. Its error can be 0.1 of a semi-tone (ten cents). Since over the years the standard of pitch with which such accuracy has been obtained has varied considerably, the term **relative pitch** is now considered a more appropriate term.

Pitch circles: In pianos, a name given to the two circles in whose tangential opposing arcs the wippen heel and the key capstan move during a key-hammer blow. The point of contact at any stage in such movement is known as a **pitch point**.

Plate: A structure of cast iron or other metal to which the strings of a piano are attached and by which, in conjunction with the wooden frame and soundboard, the tension of the strings is supported.

Plate fit: The term used for the attaching of the plate to the back assembly in either verticals or grands.

Player piano: A piano equipped to reproduce music from perforated rolls through partial vacuums produced by foot-pumped pedals or by motors.

Playing mechanism: British term for **Piano action**. **Plinthe:** British term for the **Toe-rail** (see Diagram I 42).

Pressure bar: A metal bar, usually iron or steel, screwed down over the strings of a vertical piano at the upper or tuning -pin end of the strings.

Pressure felt: See **Compression felt**.

Printed core: See **Core-print**.

Prolonge: British term for **sticker** or **abstract**.

Punchings: Small round pieces of felt, leather, paper, or cardboard used to cushion, shim or space various parts of a piano. Punchings vary in material, thickness and diameter depending on the particular purposes they are intended to serve in the piano.

Pythagorean comma: See **Comma**.

Quality: The timbre or color of a tone apart from pitch or intensity. Analytically, the harmonic content of a tone.

Rails: See **Rails** in Glossary Appendix II under heading **Rails**.

Rarefaction: A state or region of minimum pressure in a medium traversed by compression waves (as sound waves). Its opposite is called **condensation** or **compression**.

Rast: The back of a vertical piano with posts, pinblock, soundboard, plate and strings. Also, a

Name given to the reverse crown-shape in a piano back made to fit the finished sound board.

Rebuilt: See Glossary Appendix IV under heading Reconditioned.

Rebushing: The process of replacing felts such as those that surround the end portions of center pins in flanges and those that are to be found in key buttons and key holes at their points of contact with balance-rail pins and front rail pins on the keyframe.

Reconditioned: See Glossary Appendix IV under heading Reconditioned.

Registry holes: Small-bore apertures in piano plates serving as a means for accurate alignment of the plate with the soundboard bridges during the process of manufacture.

Regulation: The process of adjusting the various parts of the mechanism of a piano to each other. **Regulation button** is the small, felt-covered, button-like block that trips the single escapement action at the jack. **Regulation tools** are the specially developed instruments used in piano servicing.

Release: In Canadian usage particularly, the equivalent of let-off (q.v.).

Relief-cut: An open space introduced at certain points between the laminations of a pinblock to permit escape of moisture and heat generated in the gluing up process in the overall assembly of the pinblock on related parts.

Repetition-lever: The upper element of the wippen in a grand piano designed to hold up the hammer at the knuckle (q.v.) upon release of key pressure so that the jack (q.v.) may return at once to its proper resting place in readiness to repeat the hammer blow. It is also called **balancier**.

Repinning: The process of resizing bushings and replacing center pins in flanges (q.v.). The installation of tuning pins of larger diameter in the pinblock to increase their resistance to turning.

Resonance: An intensified sound that occurs in the sympathetic vibration of any body capable of moving coincidentally, i.e., in the same period, with the original sound.

Ribs: The light strips of wood (usually of the same material as the soundboard) that are glued transversely across the long grain of the wood of the sound board. They not only strengthen the thin board but also distribute energy obliquely to the length of the board grain.

Rim: The vertical perimeter of the grand piano. It is composed of varying numbers of wood laminations developed in special presses for the specifications of each piano according to its length. The **full bent rim** is a refinement of earlier cases that had one or more joints around the perimeter; it is the contemporary rim.

Rise: Short for **Hammer rise** (q.v.).

Rocker arms: The name used in some early pianos for a small, center-pivoted unit on the rear of a key, adjustable with two counter-balancing screws, and designed to obtain proper height of the **capstan** (q.v.) in relation to the wippen. Also, a name sometimes used for horizontal pivoted wooden arms attached to the bottom (floor) board of vertical pianos to transmit motion of the pedals through vertical rods to dampers and hammers and other parts of the action. **Pedal lever** or **pedal trap lever** are other terms used for the rocker arm in this latter sense. (Ver.)

Roller: See **Knuckle**.

Rosewood: The hardwood core of the grand knuckle (q.v.), originally made of rosewood.

Safety factor: Another name for **After-touch** (q. v.).

Scale (piano): A layout including a set of specifications covering the length, tension, weight and bearing points of each of the strings; the design of the plate, sounding board and bridges; the weight of the hammer and the exact point at which it strikes the string; plus, the relation of all these to each other and to other parts of the instrument.

Scale stick: A device to obtain accurate spacing of the strings as they are laid out on the plate (string back).

Scalloping: See **Chamfer**.

Schisma: The difference between the intervals of the justly intonated and the equally tempered intervals, mathematically, $32,805/32,768$. **Diaschisma** is the difference such as between C and D-double flat in pure, untempered intonation; the interval is $2048/2025$.

Second: See **Interval**.

Semi-tone: In the justly intonated scale, an interval having the ratio of 15:16, e.g., E to F in the scale of C major. The equally tempered semi-tone has the ratio of 1:l. 05946309435929.5

Set-off: See **Let-off**.

Set-on: See wording at Funder Diagram VI.

Seventh: See **Interval**.

Shifter; or **Shift(er)-lever:** A mechanical lever under a grand piano extending through an opening in the keybed into a slot in the keyframe to permit a shift of the action (q.v.) to the right (occasionally to the left) so that the hammers may strike the strings in unacorda position (see **unacorda**).

Shimming: The process of inserting filler-wedges of wood or other substance in an open space such as a crack in the soundboard of a piano. Placing paper under a moveable unit such as a hammer-shank flange for proper alignment of parts of a piano; **papering the flange** is an equivalent term.

Shook: Inexpensive types of wood used for boxing purposes.

Side-bearing: The amount of lateral pressure or tension involved in the change of direction given to the strings of a piano by the bridge pins.

Side glue: A manufacturer's term used for the process of attaching the end panels of the cabinet by gluing them to the end posts of the back assembly. (Vert.)

Side skirts: Ivory or plastic coverings extending downward over the sides of the keys.

Six-six keyboard: A keyboard promoted in the latter part of the 20th century having piano keys in traditional shape but with multi-colored coverings and with half tones within an octave alternating between main-level and raised keys in a six-six rather than seven-five traditional order to conform more closely to the equal temperament division of an octave. It is a modified form of the once famous Janko (q.v.) keyboard initiated and placed in short-lived production around the turn of the century.

Sixth: See **Interval**.

Skinning: The process of removing layers of felt from either hammers or dampers to create a new surface in order to establish a better tone or eliminate false and harsh tones caused by cuts

and foreign particles.

Slide bolts: See **Glider bolt** in diagram VI 9a.

Snapping: Another term for **Chipping** (q.v.).

Sonance: The quality of a tone as determined by harmonic structure of successive waves in the tone as a whole; successive functions of changing harmonic structures during the maintenance of a musical tone.

Sonometer: An acoustical instrument for measuring and observing frequency ratios.

Sostenuto: From Latin **sostenere**, to sustain, meaning held for the full indicated time value, or somewhat prolonged in the time value of tones. In many grand pianos and in some vertical pianos, depression of the middle (sostenuto) pedal turns the lip of a rod in the action to catch and hold the tabs projecting from the under lever top flanges (damper lever wire flanges) of raised dampers, thus suspending those dampers until pedal pressure is removed; abbreviated **sost.**, **sosten.** The plural, **sostentos** or **sostenuti**, signifies a movement or passage calling for sostenuto pedal action.

Sound: A metal sensation produced through the organs of hearing; an alteration or disturbance, propagated in an elastic material acting as a carrier, that produces auditory sensations.

Soundboard: A major component of the piano, diaphragmatic in character, that gives or amplifies mechanical resonance.

Soundboard press: A solid wooden frame structure designed to hold the soundboard and ribs under pressure during the gluing process in such a manner as to produce the **crown** (q.v.). The pressure is sometimes exerted by **go-bars** (q.v.) but more generally by hydraulic force.

Specific response: A response to one rate of vibration rather than another.

Spine: A term, chiefly European, for the soundboard molding on top of the soundboard along the long side of the rim of a grand piano.

Spinet: Historically, a small, usually rectangular, form of harpsichord; currently, an ultrasmall vertical piano in many instances using a dropaction (q.v.) and usually less than 40" in height. See, also, **consolette**.

Splicing: The process of repairing a broken string by tying on the broken-off end or adding a length of new wire. Also, the binding together of the parts of a broken key stick or of a broken hammer shank.

Spoon: In vertical pianos, a small, spoon-shaped, flattened wire projecting from the rear of the wippen whereby contact can be made with the damper lever; in grand pianos, occasionally, a similar projection from the forward end of the under lever (damper lever) to control the rise and fall of the damper; and, occasionally, a similar upward projection to serve as a resting point for the jack (fly) button.

Stanchion: (From old French *estanson*). An upright bar, beam, or post used as a support; in verticals, any one of the substantial back posts of the wooden frame.

Sticker: See **Abstract**.

Stretched octave: In piano tuning the natural expansion of an octave due to inharmonicity (q.v.). Also the deliberate sharpening of pitches in higher registers to achieve brilliance.

Stretcher: A strip of varying width across the front of a grand piano above the fall board. Made of strong rigid wooden stock, it is usually glued to each side of the case and often to the front of the pinblock and is secured to the rim by heavy screws through the flanges at its edges. It is frequently called the bellyman strip or front rail.

Strike- or striking- line: The line formed by the series of points at which hammers in motion make contact with their respective strings.

Striking distance: Same as **Hammer blow** (2).

Striking point: The point at which the hammer strikes the string, roughly one-seventh to one-ninth of the speaking length of the string.

Stringing: The process of attaching the strings (wires) of a piano to the tuning pins and hitch pins.

Strings: The chords of a musical instrument; in pianos, the high grade steel wires stretched on the plate and over the soundboard.

Stroboscope: From Greek word strobos meaning **twisting** or **whirling around**. An instrument for observing the successive phases of periodic motions by means of periodically interrupted light.

Strut: Any one of the elongated braces in a piano plate, designed to resist pressure in the direction of its length. Also, structural units serving similar purpose in the wooden underframe of a grand piano.

Sustenuto: A questionable variant for **sostenuto** (q.v.).

Swing: A name sometimes used for wippen (q.v.) but better reserved for the moveable arm by which the hammer rest rail is moved toward the strings to shorten the hammer blow for softer tones.

Sympathetic vibrations: Pulsations produced in one body by vibrations occurring in another; e.g., sounds produced by one struck string in another undamped string or in an aliquot of that string as in a duplex scale.

Syntonic comma: See **Comma**.

Temperament: One of the several systems or methods for slightly modifying the intervals of a scale to permit modulations without the inconvenience of many distinctions of pitch; the compromises in frequencies of the 12-note scale in fixed tone instruments to permit more expedient use of all the chromatic keys. Sometimes called **bearing**. Best known is the contemporary equally tempered scale.

Tension felt: The outer layers of hammer felt, which, by reason of being glued at their tapered ends to the hammer head under great pressure, serve to compress and restrain the unglued inner layers, called **compression felt** (q.v.). (The term **Pressure felt** is sometimes loosely used in reference to either inner or outer layers, depending on whether the pressure of the outer layers to restrain or of the inner layers to escape is meant.)

Tension resonator: Radial arms of inflexible steel joined under or behind the sounding board and bolted to the inner rim in grands or to the wooden frame in vertical pianos. Drawn to precise permanent tension, the arms are designed to safeguard the critical crown (q.v.) of the soundboard.

T-Hammer: The original T-shaped tool for tuning pianos, harps, clavichords, and dulcimers; now superseded by the long-handled tuning hammer though still used for special purposes by piano technicians.

Third: See **Interval**.

Timbre: Qualities of a musical tone (as distinguished from pitch and loudness), by which different kinds and qualities of musical instruments can be identified. With the invention and development of electronic measuring instruments, harmonic analyses may be made that reveal the harmonic content (quality) of a given tone.

Tonality: The musical character of a mode or melody by reason of the musical relationship of the notes employed.

Tone: A musical sound considered with reference to its quality. Also, a sound of definite pitch and character produced by regular vibration of a sounding body. Also, one of the larger intervals between successive notes of the diatonic scale, a major second, sometimes called a whole-tone as opposed to a semi-tone.

Tone regulation: See **Voicing**. A more precise term for the process familiarly known as **Voicing** (q.v.).

Tongues: The series of spaced rectangular teeth on a continuous brass flange rail which, with their corresponding butt plates (q.v.), serve as clamps to hold the center pins of hammer butts, and, in certain pianos, of damper levers.

Toning: A word seriously contending with **voicing** for the treatment of the hammer for tone regulation, but hampered by the tendency to confuse the words **toning** and **tuning**. The word is primarily of British usage.

Tonometer: An apparatus, originally consisting of tuning forks, for producing accurate frequencies.

Torque: A force which, when applied externally to a body (e.g. a tuning pin), tends to produce a rotary motion. Examples of torque are: the force exerted on a tuning pin by a taut piano string; the force exerted on a tuning pin by the tuning hammer in turning the pin to raise or lower the string tension.

Torsional strain: Elastic twisting deformation in a body (e.g. tuning pin), which accompanies torsional stress, as a result of opposing torques. A tuning pin anchored in a pinblock and holding a taut string, *always* contains torsional stress, and *always* contains torsional strain although the strain may be so small as to be imperceptible by ordinary means of observation. (It should be realized that bending stress and bending strain are also present in the tuning pin, since the forces of the taut string and the tuning hammer also tend to produce bending.)

Torsional stress: The internal resisting force within a body (e.g. tuning pin) which results when a torque is resisted by an opposing torque applied at a different point. Examples: The torque of the taut string resisting that of the tuning hammer; the static torque of the tuning pin anchorage resisting the torques of both string and tuning hammer.

Touch: Responsiveness of a piano, particularly of its keys and action, to the will of the player. (See **Laying Touch**). Also the skill of a performer **in** execution and control at the keyboard.

Touch-weight: A term to denote pressure measurements that fall into two distinct groups: the manufacturer's touch-weight and the player's touch-weight. That of the manufacturer may be divided into down-weight (q.v.) and up-weight (q.v.), sometimes called down-travel weight and up-travel weight. That of the player may be thought of as a highly important but widely differing evaluation (feeling) of the response of the key and its associated parts to the touch of individual players.

Trap work: The system of levers and rods held in position by the lyre in grand pianos; also, the levers and rods (sometimes called dowels) within a vertical piano that are activated by their respective pedals.

Travel: The rise and fall of the hammer and the hammershank. Travelling hammer shanks (often shortened to hammer travelling) is a procedure used to position the centerpin of the hammershank flange in a plane parallel to the plane of the strings thus allowing the hammershanks to travel directly toward the strings. The correction is accomplished by the use of paper shims under the flange.

Tuning: See section III in Glossary Appendix on **Tuning**.

Tuning bar: A metal bar whose vibrations are of a standard frequency, used for comparative purposes in tuning musical instruments. It is usually mounted on a resonance chamber.

Tuning fork: A metal bar whose vibrations are of a standard frequency. Made in a U shape, it is used like a tuning bar for tuning musical instruments.

Tuning hammer: A special tool for achieving the exact position at which the piano technician desires the tuning pin to rest. Also called Tuning lever.

Tuning lever: See **Tuning hammer**.

Tuning pin: A cylindrical threaded steel rod, about two and a half inches long and a bit over one fourth of an inch in diameter, fitted tightly into a hole drilled in the pinblock (q.v.). One end of a string is attached to the protruding end of the pin by a coil of the string and a becket (q.v.); the squared shape of this end permits use of a tuning hammer to turn the pin and to make fine adjustments in its position for tuning purposes. Seven graduated diameters of tuning pins are found in pianos, and smaller diameters are available for dulcimers and zithers.

Tuning pin plank: Same as Pinblock.

Unacorda: A positioning of the action in a grand piano so that one string of each two- or three- string unison escapes the hammer blow, thereby softening the tone produced by the striking of the key. Changing the position of the action is accomplished through the use of the left pedal and its corresponding shift-lever (q.v.).

Undulation: The action of rising and falling, in musical tones, as if on waves.

Unison: Two or three strings struck by the same hammer and producing the same pitch.

Universal: A name sometimes given to the swivel (double-swing) damper-wire block to allow the damper to seat itself squarely on the strings of a unison, both side-wise and length-wise. It is found chiefly in certain European actions.

Universal string: A single-wound replacement bass string in a series of various sizes designed so that the winding may be cut and the string length determined at the piano for on-the-spot repairs.

Upper beam: See final paragraph under **GLAP Rails**.

Upper bottom panel: Some small pianos have the bottom panel divided into two parts. upper and lower, with one positioned slightly forward of the other and joined to it by a horizontal **bottom panel connector**.

Upright: A vertical piano of forty-five or more inches in height.

Up-travel weight: Generally shortened to up-weight (q.v.).

Up-weight: The amount of weight (usually measured in grams) that a key will lift from full depression to its position of rest. For the method of obtaining this measurement see **down-weight**. See also **Touch**, and **Touch-weight**.

V-bar: An extension of the cast iron plate that runs under the strings near their tuning pin ends. Through deflection of the strings by a pressure bar (q.v.) between it and the tuning pins, the V-bar establishes one end of the speaking length of the strings.

Ventral segments: The several equal parts into which a vibrating stretched string tends to divide itself.

Vertical: A piano of any size whose strings lie in a vertical plane.

Vibration: A periodic motion transmitted through some elastic medium, particularly the air, resulting in musical tones in a piano or other musical instrument. Also called **Wave**.

Voicing: The process of regulating the tone of a piano, primarily through hammer conditioning (q.v.) but also through care for the basic structure of the instrument, through regulation of the various parts, and through tuning. The goal is to obtain maximum quality of tone and uniformity of sound from the whole gamut of strings in a piano. Also known as **Tone regulation**.

Volume: The degree of loudness or the intensity of a sound.

Wave: See **Vibration**.

Web: That part of the plate perforated by the holes through which the tuning pins are inserted into the pin-block (wrest-plank).

Webbing: Felt or cloth strips used to mute the non-speaking parts of strings in a piano.

Wedge: In grand pianos, a wooden or metal block designed to obtain a rigid contact between the nose (q.v.) and the crossblock (belly bars). In uprights, a wooden block placed between the plate and soundboard to keep them properly separated and rigidly held in position.

White noise: A random combination of audio frequencies producing a sound similar to that of rushing water.

Winking: A visual and tactual regulation procedure to obtain proper positioning of a number of different parts of a piano action. See **Winking** in the appendix to this glossary, section I.

Wippen: A mechanical unit of hinged wooden parts in the action of a piano between the rear end of a key and its corresponding hammer butt or knuckle, designed to transmit controlled energy generated at the front end of a key to its respective hammer through a jack (q.v.) to produce desired sounds in the appropriate strings.

Wolf: Dissonances in some chords, particularly in pianos and other fixed tone instruments, in certain intervals of the mean tone tempered scale (q.v.).

Wrest-pin: See **Tuning pin**.

Wrest-plank: See **Pinblock**.

GLOSSARY APPENDIX

Containing items which, in their expanded form, seemed
out of place among the shorter items
in the main Glossary

- I. Winking
- II. Rails
- III. Tuning
- IV. Reconditioned

Please note that q.v. after numerous words in the
Glossary Appendix
stands for the Latin *quod vide* = which see,
meaning: Look up the words in question in the
main Glossary

Glossary Appendix

I. **Winking**

By Stephen S. Jellen
(Technical Advisor to Pratt, Read & Co.)
and Edwin W. Wood

**

Winking: A term used in at least four different connections in the piano industry, designating a very slight movement discernible to the eye or to the touch in the process of regulating certain parts of the piano by moving, touching, pushing, dragging, etc., motions under finger control.

1. **Winking the jacks:** A regulation procedure to obtain maximum striking power in a grand action by eliminating "lost motion" in the relationship to each other of knuckle, top of the jack, and upper side of the repetition lever or balancier. This least understood step in the regulation of grand pianos requires a basic careful regulation of all wippen (support) parts in their proper order. The crucial part of the operation is the adjustment of the repetition-lever spring. Failure at this point is responsible for the frequently asked question: "How is it that the hammer line never comes out evenly no matter how carefully I line up the capstans?" The answer generally is: "Lost motion in the jack-to-knuckle relationship." The test for proper regulation in this respect is to have the top of the jack so aligned with the top of the repetition lever as to obtain a slight movement, the **wink**, of the hammer when the jack heel is tripped with the finger, showing that the hammer, hammer shank, and knuckle are supported by the repetition lever alone in readiness for the jack to return to its normal position without hesitation at its point of contact with the knuckle.

2. **Winking the spoons:** An action-setting procedure in the regulation of vertical pianos in the factory or rebuilding shop. After a new action is "hung" and the damper wires have been aligned with the strings, the dampers are glued into position and then "travelled" with the use of the sustaining pedal. The hammer rail and spring rail are installed. Afterwards, new shanked-hammers are glued in and lined up to the strings. At this point, a "jig" is inserted between hammers and strings, permitting the hammers to be moved forward and stopped at one-half the hammer travel distance. Then each hammer unit is raised by pressure under the wippen (keys have not yet been mounted); and when the tip of the hammer touches the jig, the damper head should show the barest movement, a **wink**. By thus **winking the spoons**, when the keys are finally installed and correctly dipped, a chord or series of notes may be played with the spoons picking up each damper simultaneously with the others; and, if the keys are held down, all damper heads will remain at the same distance from the strings, leaving an "even feel" to the touch.

3. **Winking the dampers:** A regulation procedure for setting dampers (new or refelted) in grand pianos. Upon installation of a new set of dampers in a grand piano in the factory, or a refelted set in a rebuilt grand in a work-shop, dampers must be aligned with the strings so that there is no left to right drift, no front or back lift drift, no springing, no wide or narrow spacing, no guide-rail binding, no excessive play.

If one then works the damper tray (or damper table) with the pedal (or with the hands if pedals are not connected, making sure that the lift is at the dowel position), all dampers should barely move, i.e., **wink** slightly, all at the same moment just as they are ready to rise from the strings. Late **winkers** are to be raised with paper under the damper tray felt **in front** (felt on the

damper tray being glued only on the back edge, stringside, for this purpose). The early **winkers** require slight scraping of the bottoms of the levers to retard the rise. This final winking process can be effective only if the dampers have been correctly installed in the first place. The pedal (or hand) movement must be carried out **very slowly** so that each movement of each part is visually or tactually sensed.

4. **Winking the Bridle tapes:** (Procedure proposed by Edwin W. Wood). For regulation of bridle tapes on verticals, secure the hammer rail in the raised position obtained by fully depressing the soft pedal; adjust the bridle wires so that the barest movement of the hammer rail causes the corresponding keys, when played, to wink (i.e., to drop) ever so slightly; then gently bend the wires toward the strings until the winking just ceases upon movement of the rail. The bridle tape should now be in position to function properly.

Glossary Appendix

II. Rails

Pianos are constructed with the use of numerous rails. Some of them are not easily made visible in diagrams, at least to the point of making clear their functions. It has been thought that the bringing together in one place of the terms and definitions of rails would help the reader to gain a clearer picture of the construction and operation of the larger components of a piano than would be possible if these terms were scattered here and there throughout the glossary. It is to be hoped that this arrangement will make possible a speedy identification of particular rails and a ready understanding of their functions.

For further clarification, rails have been divided into three groups: Action; Keys; Case. Also, the letters **Gr.** and / or **Ver.** have been inserted at the ends of paragraphs to indicate that the terms are applicable to grands and/or verticals, respectively. (Verticals include all pianos with strings running vertically rather than horizontally.)

I. ACTION

Action: The removable body of those piano parts which transmit to the strings the force resulting from a player's striking of the keys.

Action rail: See **Main action rail.** (Gr. & Ver.)

Action support rail: A bar across the lower frame-work of a vertical piano, particularly in drop action instruments, supporting the **action** (q.v. in Main Glossary). (Ver.)

Auxiliary whip rail: A bar attached to an arm of the action bracket in some drop actions to hold the **auxiliary whip (wippen) flange.** (See XXIV 9). (Ver.)

Beam rail: See **Main action rail.**

Damper guide rail: A thin wooden bar positioned above and protruding beyond the forward edge of the soundboard into the action-housing. Its extended portion is perforated with bushed holes to position the damper wires which extend downward into their respective damper lift flanges. (Gr.)

Damper lever (flange) rail: The bar, in the housing for the action in a grand piano, to which are attached the flanges for the **damper (under) levers.** See diagrams XIII 6 and XVI 19. (Gr.)

Damper lift rail: A bar, board, or tray extending under all damper flanges in a grand piano, designed to control through pedal pressure the length of time during which the strings may continue to sound while dampers are withdrawn beyond the reach of the vibrating strings. It is also known as the **swing rail.**

Damper stop rail: A bar, usually of wood, attached to the under side of the middle belly rail in a grand piano with screws that permit adjustment for stopping the damper under lever at the proper point in its upward swing. It is also known as the **damper up stop rail.** (Gr.) In verticals, the name is frequently used for the **spring rail** (q.v.). (Ver.)

Damper up stop rail: See **Damper stop rail.**

Drop rail: A bar extending downward in some pianos from the front edge of the fallboard to cover the keyboard when not in use.

Front rail: *See footnote

Hammer flange rail: In grand pianos, the rail to which hammer flanges are attached. The term is not to be confused with **hammer rail** or **hammer rest rail**. (See these terms as defined below). (Gr.)

Hammer half-blow rail: The moveable bar, cloth covered, in front of the fixed bar in a divided hammer rest rail (q.v.). It allows the hammers to be moved closer to the strings to soften the sounds that follow upon hammer blows of a given intensity. (Ver.)

Hammer rail: In a vertical piano, the long cloth-covered bar on which the hammer shanks lean when at rest. Though it would seem appropriate to call this the hammer shank rail, ordinarily it is not so named lest it be confused with that term as used in grand pianos as indicated below. (Ver.)

Hammer rail beam: See **Main action rail**.

Hammer rest rail: A term, frequently shortened to **hammer rest**, used as the equivalent of hammer rail in vertical pianos. (Ver.) It is also questionably used as the equivalent of **hammer shank rail** in grands even where the hammer shanks when not in motion do not rest upon it. (Gr.)

Hammer shank rail: The felted bar which lies under the hammer shanks in a grand piano. In a few earlier makes of piano, the hammers lie directly on the felt when the hammer is at rest; but in most grands this bar is separated by about a hammer shank's width from the hammer shank at rest. Ordinarily this rail serves as a safety check to eliminate noise and to help the hammer return promptly to its correct position for speedy repetition. (Gr.)

Jack retaining rail: = **Jack stop rail**.

Jack stop rail: A narrow felted strip, usually of wood, in some vertical pianos, attached by brackets to the main action rail and positioned to limit the jack travel after escapement.

Let off rail: See **Regulating rail**.

Lower action rail: A bar (running the full length of the action) designed to support the flanges for the tongues which hold the bottom ends of the stickers in place over the capstans in certain upright pianos. Also called **sticker tongue flange rail**.

Main action rail: A bar, generally of wooden construction, varying in thickness and running the entire length of the action. It is cut with grooves and ridges to provide a stable base for the moving parts of the action. In verticals, the flanges for wippens, hammers and dampers are usually attached to it. Some other parts such as the regulating rail post and the damper rods are customarily fastened to this rail, which is also known as the main rail, beam rail, hammer rail beam. In grand pianos, its main function is to support the wippens and the hammer shank rail (Gr. & Ver.)

Main rail: A shorter term for main action rail (q.v.).

Regulating rail: A narrow strip, usually of wood, attached to the main action rail in verticals and to the hammer flange rail in grands. It is positioned slightly above the heel or toe of the jack. Felted buttons are attached to the rail with adjustable screws to make possible the escapement of the jack at the proper time during a hammer blow. This rail is also known as the let off rail and (in British use) as the set off rail or drop off rail. (Gr. & Ver.)

Spring rail: In vertical pianos, a strip to which are attached the hammer butt springs to facilitate the return of the hammer to the hammer rail after a key has been struck. See, also, its

use under the heading **damper stop rail**. (Ver.)

Sticker tongue flange rail: See **lower action rail** and diagram VII 2c.

Swing rail: See **Damper lift rail**.

Top deck rail: Same as **Hammer rail**.

II. KEYS

Back rail (keyframe): The keys of a piano operate on three rails constituting, generally, the keyframe. One is the front rail under that end of the keys which has the key covering. The second is the balance rail on which the keys pivot. The third is the black rail on which the wippen-contact end of the keys rest. In some makes of pianos, the keybed itself serves as the back rail. In the latter instance, the keyframe is known as a two-rail frame; in the former, it is called a three-rail frame. See diagrams VI. (Gr. & Ver.)

Balance rail: The name given to the middle rail of a three-rail keyframe or the rear rail of a two-rail keyframe. The keys pivot on this rail. See under **back rail** above. (Gr. & Ver.)

Front rail: The name given to that rail in the keyframe which lies under the keys at their key-covering ends. (Gr. & Ver.) For other uses of the term see the same words under CASE with accompanying note.

Key stop rail: The name given to the upstop bar positioned over the keys between the front and balance rails. Also known as **Key strip**. (Gr.)

III. CASE (Including Housing)

Belly rail: The heavy beam-like structure forming the back end of the action housing in a grand piano. It is usually constructed of three bars, called the bottom, middle, and top belly rails. The middle rail rests at its rear edge on the bottom rail and extends forward toward the keyboard to provide space underneath for the damper controls. The forward edge of the middle rail supports the top rail on the upper side of which the sound board rests. These three rails are generally made from different kinds of wood. The belly rail is also known as belly bars, back bars, cross blocks, and front rail (but see **Front rail** below). (Gr.)

Closing in rail: A seldom used name for the top belly bar signifying the tie-in between the nose of the plate and the belly bars and braces in a grand piano. (Gr.)

Foot rail: See **Pedal rail** below.

Front cross rail: *See footnote below.

Front rail: *See footnote below.

Keybed rail: In some grand pianos, a wooden bar at the end of the keybed under the belly rails, designed to strengthen the tie-in of the keybed with the other substructure parts of the instrument. (Gr.) Also, one of several units of the foundation under the keys in vertical pianos.

Key slip rail (commonly known under the shorter term **key slip**): A finished slender wooden bar fastened in front of the keys to the keybed to close up the space between the keys and the keybed and to provide an aesthetically pleasing front for the keyframe and the keyboard. (Gr. & Ver.)

Music desk rail: The wide wooden bar which holds the music desk and slides on guide strip tongues on the rim of a grand piano. (Gr.)

Pedal rail: A horizontal bar at the bottom front edge of the case in a vertical piano. It reaches between the sides of the case and generally holds in place the bottom panel through dowels projecting from the underside of the panel. The pedals protrude on either side of the bar through slots in whose sides pins usually are positioned to permit the pedals to swivel. It is also known as the **toe rail** and as the **foot rail**.

Stretcher rail (commonly known as **stretcher**): The visible wooden bar or beam above the fallboard in a grand piano, reaching between the upper ends of the rims to help give stability to the case at the point where a large opening has to be left for the insertion and removal of the action. It is also known as front rail (q.v.), front bar, upper beam, stiffener bar. (Gr.)

Toe rail: See **Pedal rail** above.

*Footnote on Front Rail

The words **front rail** are used for at least three different parts of the grand piano: 1). The foremost rail on the keyframe, nearest to the keyslip, (see diagram VI); 2). The top belly rail (q.v. in GL); 3). The bar widely known as front bar, upper beam, and other names mentioned below. (a definition of it will be found in GL under **stretcher rail** = stretcher)

Because this third part of a grand piano is very much before the eyes of musicians as well as of technicians, it would seem wise to have a name for it that the public as well as the technician would quickly understand. One term used in some areas is **front bar**. We propose changing these words to **frontal bar** with the hope that it might become the standard term. We do so for the following reasons.

For one thing, these words avoid the confusions indicated in the first paragraph above. Also, **bar** is a more apt word than **rail** for the function involved. A rail is ordinarily thought of as a supporter of weight, while a bar either holds things together or keeps them apart, and stands in front of other items out of normal reach behind it. Further, the word **frontal** is more meaningful at this point than **front**. The latter word implies a corresponding back part of which there is no visible evidence for the casual observer. Frontal, on the other hand, merely suggests something in the foreground of the viewer, and that is all that is needed here.

Considering some of the other terms in use, **front beam** and **upper beam** both imply a back- or under-beam which the observer does not readily see or easily locate; and the word **beam** suggests a more massive wooden structure than appears at the front of a piano. **Stretcher** and **stiffener bar** both clearly define the function of the bar as rigidly holding together or apart the sides of a piano at its keyboard end; but these words serve chiefly as specifics for piano technicians or builders. **Cornice** is an apt word in terms of both appearance and function, but it is largely confined to the architect's vocabulary. **Bellyman strip** is a technical word needing too much explanation for general use.

We urge the adoption of **frontal bar** as a standard term carrying within it a clear indication of the nature and function of this particular part of the piano; it does not select the usage of any one manufacturer or technical group as over against others; and it represents without question what any viewer sees as he looks at this part of the instrument.

Glossary Appendix III

Tuning

Tuning is the all-important process through which a musical instrument is enabled to produce its range of sound according to its original design and in a manner acceptable to the human ear. It is a matter of adjusting strings, or bodies of air as in organ pipes, to bring the sounds emitted by them into a desired relationship of pitch. In pianos and organs the critical part of the procedure is the setting of a temperament (q.v.) within a selected octave in the central part of the instrument. A single note such as **C** or **A** is set at the proper pitch by comparison with a tuning fork or other source of pitch standard (usually **A 440**, i.e., middle **A** vibrating 440 times a second). Other notes within the octave are then tuned from that note as a center of reference. Carefully calculated slight departures from pure harmony (beats, q.v.) are deliberately introduced among the intervals (q.v.) to make possible the use of any one note of the chromatic scale as the tonic note or beginning point of an acceptable musical scale. Tuning aims thereafter to obtain pure (beatless) octaves throughout the whole keyboard.

The proper distribution of beats in the tuning process depends on a mathematical understanding of the properties of vibrating wires or columns of air. For this reason, and because of the departure from pure harmony involved in the division, tuning cannot be accomplished merely by the possession of a good ear for music; hence the disappointment, confusion, and sometimes costly error on the part of musicians who have tried the "do it yourself" method.

Inexperienced persons may find help in the regulation of beats through the use of electronic equipment, but in addition to this special feature of all keyboard-instrument tuning, numerous special techniques are involved that put the art of good tuning beyond the reach of the untrained, however musically-minded they may be. These techniques include: the ability to set the pin (settle the wire), so basic to the stability of tuning; the use of various tests to obtain accuracy in tuning intervals; the understanding of voicing (q.v.) to achieve the best possible tone; all of these and many other aspects of the work require long experience and special skills that constitute professional competence.

Pianos in general do not receive all the professional attention that should be given them. Instruments in constant use for musical concerts or training programs need tuner-attention many times during a year; and all pianos need a piano technician's care twice a year in most areas, and at least once a year elsewhere. Unattended pianos normally drop slightly in pitch each year, thereby becoming less and less effective in their musical output. Felts may disintegrate, center pins may stick, tuning pins may loosen, and many other faults can develop that call for expert attention.

In the performance of his work, the professional tuner may therefore find it necessary to carry out a number of special tasks such as replacing broken strings, tightening tuning pins, refelting a keyboard, or regulating (q.v.) the action. Voicing may also be deemed advisable. These tuning-related undertakings are not part of the tuning as such. They are quite separate functions that ordinarily call for additional payments beyond the price of tuning itself. Every musician should know that pianos need such extra care, and will not hesitate to provide it to make sure that any instrument of this kind in his charge will yield the best music of which it is capable.

Glossary Appendix IV

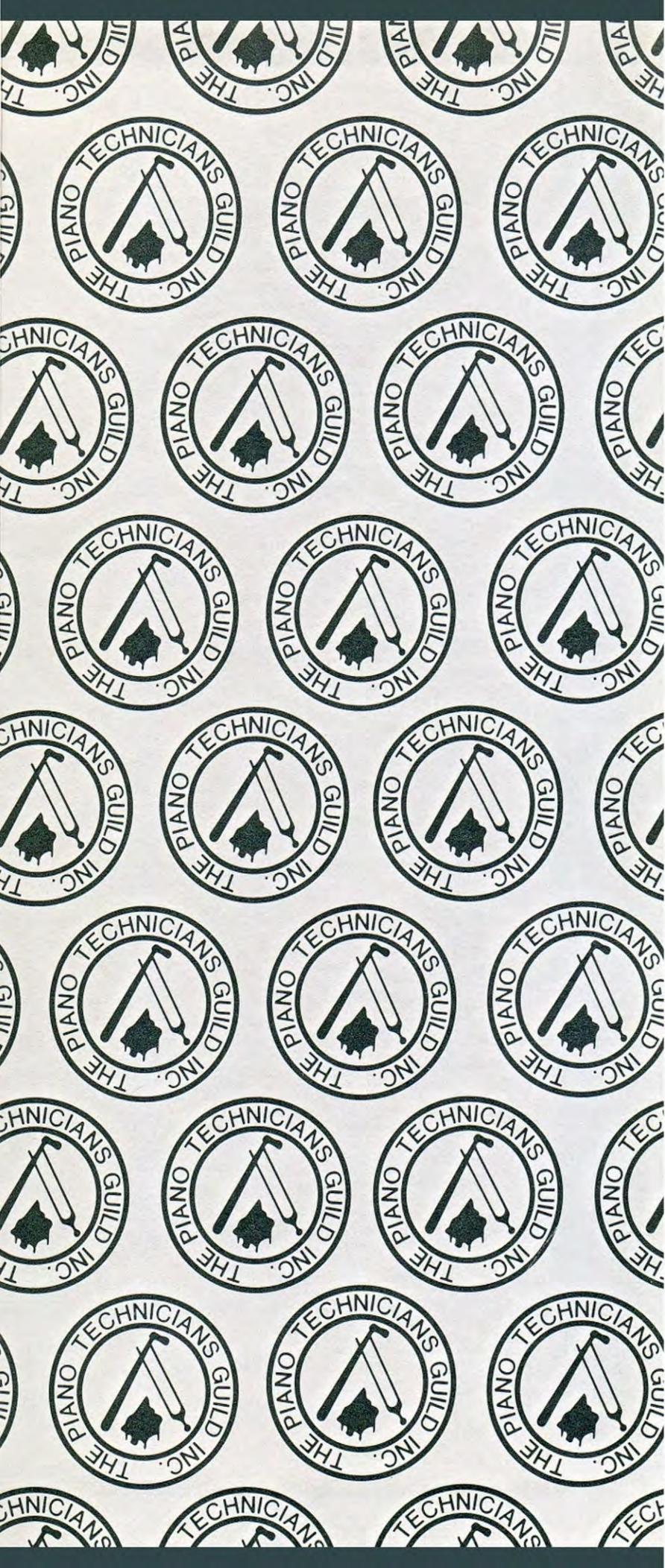
Reconditioned

Many individuals and organizations buy or take in trade used pianos, proceed to put them into improved working order, and then place them again on the market. Such pianos differ widely, of course, in the amount of work needed to restore them to properly functioning order. The changes required may be few or many, but the total range of operations may be summed up under the following headings: recovering and readjusting keys; refelting the keyframe; reshaping or replacing hammers and dampers; regulating the entire action including adjustments in pedals and trapwork; repairing bridges and soundboard (with occasional replacing of the soundboard); installing a new pinblock; restringing with tuning and voicing; and, refinishing the case.

Wide usage suggests that the best word to describe a piano that has undergone all or part of these alterations is **reconditioned**. It can cover the whole gamut of possible improvements as well as any significant part of them. However, because its scope is so broad, it becomes meaningful as a label only when accompanied by a list of the actual units of work carried out so that both seller and buyer may be properly informed as to the condition of the instrument. It is to be hoped that this procedure will become universal in the piano mart.

Another word, **rebuilt**, is in somewhat wide usage as the equivalent of **reconditioned** in the foregoing references; but a difficulty arises in its use. The word **rebuilt** implies complete renovation in terms of the total changes mentioned in the first paragraph above. When used to indicate only partial restoration, even with explanations listed, it easily leads to confusion of thought and even deception in the buyer-seller relationship. When employed it should be limited to the whole renewal program that we have been considering.

Still other words (**restored, renewed, renovated, etc.**) could be drawn into the picture; but the term **reconditioned** seems adequate and has wide acceptance. It covers the whole field of changes satisfactorily; and its meaning is quickly grasped by reason of its many other uses in everyday language. **Reconditioned** may in time completely supplant the word **rebuilt**; but if the two terms are to be used side by side, it should be only with clear understanding of the differences in their meaning.



No student or teacher of the piano should be without this necessary source material. For the first time, everything you need to know about the functioning of your piano has been compiled between the covers of one volume. Everything you need to know to communicate with that other musical artist — your piano tuner-technician — is here.

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